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RETIREMENT OF PROFESSOR JAMES LAW, F.R.C.V.S., DIRECTOR OF THE NEW YORK STATE VETERINARY COLLEGE.

At the close of the current university year, in June, Professor James Law, F.R.C.V.S., will retire from his position as Director of the New York State Veterinary College at Cornell University, Ithaca, New York. His retirement carries, under the provisions of the Carnegie fund, a liberal pension.

Professor Law was born in 1838 at West Calder, Scotland, and graduated with high honours from the Edinburgh Veterinary College in 1857 at the age of nineteen years. Subsequently he served as demonstrator of anatomy, then as professor of materia medica, and later as professor of anatomy in the New Veterinary College and the Albert Veterinary College in London. The year 1862 he devoted to study in the veterinary schools of Lyons and Alfort, and in the following year received the title of M.R.C.V.S., to be followed in 1870 by that of F.R.C.V.S.

Early during his professional career he was joint author with Professor Gamgee of a comprehensive work upon veterinary anatomy, and was a liberal contributor to the agricultural press in Scotland. When Cornell University was established in Ithaca, New York, in 1868, Professor Law accepted a call to the professorship of veterinary medicine in the agricultural department, in which position he remained until the establishment of the New York State Veterinary College as a college in the University in 1896, when he became director, so that, upon his retirement, he will have completed forty years of continuous service in the University.

Prior to the establishment of the Bureau of Animal Industry and of the United States Department of Agriculture, Professor Law was chairman of the United States Treasury Cattle Commission, inaugurated the system of quarantine for imported animals, and took a very conspicuous part in the investigations of the character of hog cholera and other infectious diseases of domestic animals. Later he took the leading part in the eradication of contagious pleuro-pneumonia of cattle from the United States, the most conspicuous service rendered by him as a sanitarian. This insidious malady had become widely disseminated and thoroughly intrenched over a large area on the Atlantic seaboard, and had later found its way into Chicago, Illinois, and other points in that State. Under his leadership the disease was promptly and so thoroughly extirpated that no trace of it has since been discovered, a record that has rarely, if at all, been equalled in the history of veterinary sanitary science.

He has also taken a prominent part upon several occasions in the extirpation of foot-and-mouth disease, and has frequently been consulted in relation to the control of other infectious maladies.

In 1876 he published "The Farmer's Veterinary Adviser," which has run through a number of editions, and has taken first rank among popular handbooks upon veterinary science for the use of owners of live stock, and in so tactful a manner that it has benefitted the veterinary profession instead of injuring it, as most works of this class are alleged to do.

He has also been a frequent contributor to various agricultural and live stock papers, in which he has done much to place scientific veterinary medicine upon a high plane in the minds of agriculturists and live stock owners. He has probably come into closer and more harmonious touch in this respect with the live stock owners of America than any other veterinarian, and, through his efforts during the pioneer days of veterinary science in this country, rendered a conspicuous service through teaching the public the dignity of the veterinary profession.

The contribution to veterinary science by which he will be remembered and finally judged is his "Veterinary Medicine," consisting of five large volumes, and now in its second edition.

He has twice served the New York State Veterinary Medical Society as President, and during 1897 was President of the American Veterinary Medical Association.

As a teacher of veterinary science, Professor Law has won a prominent place in America. He has possessed in a large degree the faculty of inspiring his students to enter vigorously and successfully into research work, and from his earlier classes have gone out a number of the most conspicuous veterinarians and investigators of animal diseases known in America. Among his former students who have become conspicuous we may mention Dr. D. E. Salmon, who was the

first chief of the United States Bureau of Animal Industry, and who brought that Bureau to a high state of efficiency, and Dr. Theobald Smith, who for a number of years was Chief Pathologist in the Bureau of Animal Industry, where his investigations regarding Texas fever and other animal diseases gave him a world-wide reputation. He is now Pathologist to the State Board of Health of Massachusetts. Closely associated with Dr. Smith in his work in the Bureau of Animal Industry was another former student of Dr. Law, Dr. V. A. Moore, who succeeded Dr. Smith as Chief Pathologist in the Bureau of Animal Industry, and now succeeds Dr. Law as Director of the New York State Veterinary College. Professor Leonard Pearson, Dean of the Veterinary Department of the University of Pennsylvania, and one of the most distinguished veterinarians in America, was likewise a student under Professor Law. Others of his students who have distinguished themselves might well be mentioned.

Professor Law will be very largely remembered and honoured for his high professional and personal character. Few members of the veterinary profession in America have exerted any such influence as Professor Law upon the dignity and ethics of veterinary science. He has been pre-eminently a polished and courteous veterinarian, with a kindness of heart and a readiness to advise and help anyone who might request his counsel or aid, which he has given so frankly and with such goodwill as to make the applicant feel perfectly free to return to him again whenever occasion demanded.

After more than half a century of active work in the profession, forty years of which have been spent in the one institution, it is not to be assumed that his official retirement will mean his disappearance from the veterinary profession, but, enjoying vigorous health at a ripe old age, it is to be predicted that he will continue his activities in those directions in which he may find the greatest pleasure, for a number of years to come.

Editorials.

THE VETERINARY PROFESSION AND PUBLIC HEALTH.

ELSEWHERE in this issue will be found a contribution on the above subject by Professor Woodruff, in which he puts forward several suggestions for consideration by the Council of the Royal College of Veterinary Surgeons. So far as we can see, the main point raised is, "that something more is necessary in order (1) to fit veterinary graduates in a special degree to do special work; and (2) to satisfy public health authorities that the veterinary profession, through its Council, does look upon this branch of work as important and necessary, and is prepared to recognize and certify special knowledge of and training in these subjects on the part of any graduates who may take up this work." Professor Woodruff is then ready to suggest a remedy; but the application of a remedy implies the presence of some disease or defect which we will consider first.

Professor Woodruff is evidently quite prepared to admit that the training in pathology or meat inspection, and in hygiene, as prescribed by the Royal College of Veterinary Surgeons, is sufficient to enable a veterinary surgeon to perform the technical part of the duties of an Inspector of Meat and Dairies, but that he is usually lacking in practical details. We agree that the actual training is sufficient, and consequently no alteration is necessary in that direction, but we also admit that a more or less nervous, newly qualified man would be less convincing to such business men as butchers, &c., than a man who has obtained confidence by several years additional practical experience. But even then the personal element must not be overlooked. We know of newly qualified men whose knowledge and general demeanour would carry much more weight in the eyes of a layman than men with many more years' experience. Thus we are driven to the opinion that no alteration in the routine training is necessary. But, as Professor Woodruff has pointed out, this is the day of specialists, and one cannot specialize in a general training, specialization must perforce follow a general training. Hence his remedy suggests itself, viz., that after his general

training the candidate who wishes to do so should be allowed to specialize, and after a certain period of time he should be allowed to present himself for examination in the branch in which he has specialized, and if he be proficient, and worthy to be regarded as a specialist in that branch of work, he will be awarded a certificate or diploma, which he may hold to indicate to the layman that he is particularly fitted to carry out certain work in his own special sphere. If this idea is admitted to be a good one, then the Fellowship Degree could be used for this purpose; and Professor Woodruff suggests that for examination purposes this should be divided into several branches, of which "public health work" should be one. The suggestion is one worthy of full consideration by the Council of the Royal College of Veterinary Surgeons, and we hope they will duly consider the matter, and not dismiss it lightly.

We are under the impression that one reason why the layman does not recognize the veterinary surgeon of the present day as being an authority on matters of meat inspection and milk hygiene is because the latter has no certificate, that precious bit of paper, which on the face of it shows that he has had a training and passed examinations in those subjects. This difficulty might be overcome by the insertion of a few additional words to the present diploma of membership of the Royal College of Veterinary Surgeons, or, failing that, by the granting of a special certificate by the various teaching schools to their respective graduates.

We are glad to see a move being made by some members of the profession who occupy positions as veterinary officers of health to establish an association for themselves, being mindful of our motto, "Vis unita fortior." We hope it will be successful as an organization for more or less unifying the methods of procedure of these officers, and we trust that the membership will increase rapidly.

THE DESTRUCTION OF DISEASE CARRIERS.

WE print on a later page particulars of a Society which is at present in process of formation. The "Society for the Destruction of Vermin" will interest many of our readers; it is based on

the knowledge of the important part which rats, mice, flies, &c., play in the spread of disease, and, under the direction of the distinguished scientists whose names appear on the prospectus, should do useful work in the direction in which it aims. The veterinary profession is represented on the Scientific Committee. Veterinary surgeons are invited to join in its laudable object. The Society should prove beneficial to both branches of the medical profession by drawing the respective members closer together in the attempt to investigate the various aspects of comparative pathology.

General Articles.

THE VETERINARY PROFESSION AND PUBLIC HEALTH.—A SUGGESTION.

BY H. A. WOODRUFF, PROFESSOR IN THE ROYAL VETERINARY COLLEGE, LONDON.

On several occasions, when speaking or writing on the subjects of meat or dairy inspection, I have advocated the taking of some step by the Royal College of Veterinary Surgeons to advance the training of veterinary surgeons in these and other kindred studies. May I again put forward two or three considerations which appear to be of some importance in this connection?

It is obvious that the field of useful service for the veterinarian, whilst it is being narrowed down in some directions, is widening and increasing in respect of the guardianship of Public Health. The importance of efficient and uniform meat inspection, and, even more, of dairy inspection, is being realized, not only by sanitarians, but almost, one may say, by the man in the street.

That the veterinary surgeon is the person best fitted to inspect meat, and also cows and cowsheds, is admitted *in theory* on all hands, from Royal Commissions down to Urban District Councils, but—dare it be said?—when the veterinary surgeon is approached and essays to put into practice his knowledge of meat inspection and dairy inspection, it is often found that he is woefully ignorant, not of the pathology required, nor of the scientific phraseology, but of those practical details which are all-important to the butcher, the dairy-farmer, and the tradesman. As a consequence the professional man inspires no confidence in those people amongst whom his work has to be done.

Again, the Local Authority by whom an inspector is employed often requires advice, to initiate a scheme, to decide a course of action, whether to prosecute or not, and many other questions, and here is needed the advice of a specialist. I think it is not too much to say that the training and teaching necessary to obtain the diploma M.R.C.V.S. are frequently found all too little to supply expert and special knowledge in these directions.

To come to the point, whilst not wishing to minimize the value of the general training of students for the diploma M.R.C.V.S. (and I

should be one of the last to do that), it does appear that something more is necessary in order (1) to fit veterinary graduates in a special degree to do special work, and (2) to satisfy Public Health authorities that the veterinary profession, through its Council, does look upon this branch of work as important and necessary, and is prepared to recognize and certify special knowledge of and training in these subjects on the part of any graduates who may take up this work.

There are at present one degree and several diplomas which may be obtained by veterinary surgeons, which require, among other subjects, a knowledge of veterinary public health work; but for some reason or other it is open to very few veterinary surgeons to take the necessary courses, and, moreover, these courses all include many subjects *not* related to meat and dairy inspection; in fact, like the diploma M.R.C.V.S., they are *inclusive*, instead of *specialized*.

What is wanted is a training and an examination specially adapted to meet the requirements of veterinarians who intend to devote themselves to public health work. That there is a demand for such a course I am confident, from the number of enquiries received in the past as to the best means of obtaining not only the special knowledge, but some professional recognition. The Royal College of Veterinary Surgeons is surely the body most interested and best qualified to supply the demand. It is time the profession recognized that there are various branches of work all included in veterinary science, and yet essentially special and to be specialized, and I would suggest that the Fellowship diploma affords all the inducement and opportunity necessary to develop this idea. Take the case of the degree of Doctor of Medicine in London University; here an M.B. of two years standing may proceed to the M.D. examination in any *one* of six branches, such as (1) State medicine, (2) pathology, (3) mental diseases, &c.

If, then, the Royal College of Veterinary Surgeons would alter the requirements for the F.R.C.V.S diploma—allow a member to proceed to the examination three years after qualifying, and require him to pass in one branch of several, such as (1) General Principles and Practice of Medicine and Surgery, (2) Canine Medicine and Surgery, (3) Veterinary Public Health Work, &c.—it would encourage specialization in these branches, scientific work would be necessary and would be rewarded; the diploma would be more popular because more valuable and less of a grind, because no useless, unnecessary work would have to be done; and, lastly, it would make good our claim to supply public health officers well fitted for their important duties, and so would help forward some of those measures so necessary for the public good.

ACARIASIS AS FOUND IN THE TRANSPORT ANIMALS EMPLOYED ON FIELD SERVICE.

BY CAPTAIN BARRY, F.R.C.V.S., 2nd LIFE GUARDS, WINDSOR.

THE subject of acariasis has been written on from time immemorial. It is mentioned in McQueen's edition of Neumann's Parasites, "Moses excluded mangy animals in sacrifice"; Polybius speaks of itch attacking horses and people of Cisalpine, Gaul (Cæsar's time); Celsus, a Roman writer, speaks of scabies as a contagious disease, also gave the treatment for the malady. It is not until the Crusaders visited the shores of Palestine, in Asia Minor, in the twelfth century, that we get any authentic reference to the parasitic nature of the disease, and then for many centuries after it was a matter of doubt whether the disease was due to the insect, or the insect's presence due to an alteration in the humours of the body. An abbess of a convent, in 1150 A.D., wrote on the remedies against the animalcula of itch (*Physica Sancti Hildigardis*).

In Ambrose Parè, 1664, one can read: "The flesh worms are little animals concealed in the skin, in which they burrow, crawl and gnaw bit by bit. . . . These flesh worms should be extracted by pins or needles."

Hauptmann, in the early use of the microscope, 1619, discovered the acarus, and left a very imperfect drawing of the parasite, 1657.

In 1687 Cosimo Bonomo and Diacinto Cestoni, of Lavarno, wrote a letter, the result of investigation, and states the "acarus is the sole cause of the itch," that the disease was contagious and could only be cured by external applications, and not by internal remedies as formerly used.

Abilguard, professor of the Copenhagen Veterinary School in 1787, states that he had cured a large number of mangy animals by local applications.

In spite of the above, other writers of the various schools of thought and investigation were divided as to the cause and origin of the condition until 1812, when Gales, of St. Louis Hospital, in Paris, published a paper on itch in which he stated the parasite was always present, and had proved its contagiousness by becoming infected himself, and also infecting children. The experiments were discounted for some years by other writers, who stated the sketch made by Gales, was the cheese mite, but in 1834 Francis Renuciè, a Corsican studying medicine in the same St. Louis Hospital, demonstrated the parasite by extirpating it on the point of a needle from the depths of its burrow, a method resorted to by the women of his own country.

These early writers must have been men of keen observation, for their observations were mostly carried on by naked eye, with little to guide them but the necessity of finding the evil and source of the scourge, and yet I will state in this paper I have known many men within the last few years who have failed to find the acarus or to diagnose the disease as one extremely contagious. At the same time I can quote men who have pronounced simple eczema in camels sarcoptic mange, and treated the animals so drastically with parasiticides as to permanently injure the constitution of the animal.

In writing of the acariasis as affecting the various animals of transport, the horse being the most important animal of that group, I shall

make him the type and any comparisons of the acari as found in other animals will be compared with those infecting the horse, mule, and ass. The camel, in my opinion, is the next important, as these animals are greatly used in field service in large numbers; in the Tirah campaign there were about 5,000 in use, one third of these being under treatment for scabies at one time. The disease is very prevalent amongst these animals, as on the line of march they are only connected by a nose-rope to the tail of the one in front, one man looking after four; at times these strings overlap each other and are continually rubbing one against another. At night the strings of camels are laagered together in groups of hundreds, often on ground that has been used constantly for years as the resting-place for the camel. The serwan (camel man) proper will not go on field service as a rule, and these strings of camels are left to the tender mercies of men found in

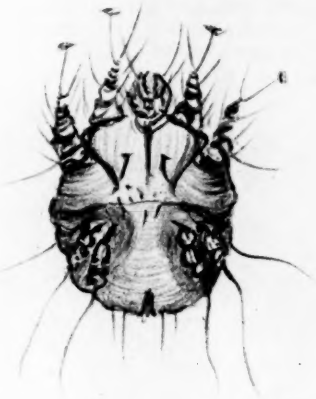

FIG. 1.—*Sarcoptes equi*, oviparous female; ventral aspect.

the bazaars who have not the slightest knowledge of the treatment of the camel, and rarely do more than remove the load and throw the food in front of them, the saddle most probably (30 lb.) left on all night for extra warmth, with not even a pretence of grooming the animal, which has been working from seven to ten hours.

The bullock being largely used in transport, although more numerous, comes next in importance, but as this animal does not undergo the privations of the camel, and as a rule is only used on the lines of communication, where the roads are fairly good, and, more important still, have men trained in their care, to drive them, and see them fed and groomed on finishing their day's work.

Mules on field service are also frequently used but are not, in my opinion, so subject to scabies as the preceding animals. These animals are, as rule, used in the mountain batteries, under the direct supervision of the various European officers and non-commissioned officers of the batteries; the animals are well cared for and exceedingly well groomed, as they have more men than mules employed. Scabies

is frequently found in the pack mules, but greater care is exercised in the stable routine than in the case of the camel, and they do not have to undergo the privations of the horse.

The ass is sometimes used for pack purposes; in the Tirah campaign there were upwards of 3,000. These animals, although receiving little or no care, were not infected with the acari to any extent, and when infected it was usually with the psoroptic acariasis. These animals, although kept separate from the horses, ponies, and mules under treatment for scabies, would frequently break loose at night, eating the hay left by the mangy animals, and, as I have stated, very few became infected with the parasite. Donkeys and mules frequently roll merrily in the sand and deep dust of the roads if left unattended, even when loaded up. It was quite a sight to see the mules and donkeys come in from the line of march, having carried their loads fifteen to twenty miles, roll in the sand, making clouds of dust, and then give themselves good shake. This may be one of the reasons of so rarely finding a mule or donkey affected with the acarus. I see it mentioned in an old book on Indian medicine, that one of the cures for scabies was to throw fine sand on the animal affected.

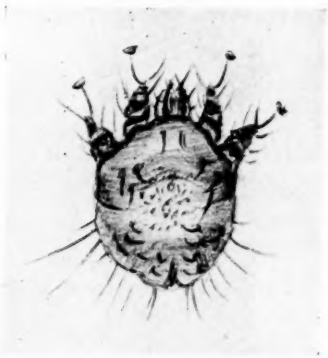

FIG. 2.—*Sarcoptes equi*, oviparous female; dorsal aspect.

DIFFERENT FORMS OF ACARIASIS.

As the name of the condition indicates, acariasis is set up by the various species of *Acari* which belong to the class of animal parasite, *Arachnida*, or the spider family. All examples of the order have a similar structure and life-history as follows:—The sexes are distinct; they possess a cephalothorax, that is to say there is no differentiation between the head, thorax, and abdomen; they possess, when adult, four pairs of legs, which are jointed; they are air-breathing parasites. The sexes are distinct, the female always being the larger. After fertilization, under favourable conditions of temperature and environment, the female deposits her eggs, from which are hatched larvæ; the larva possess three pairs of legs and consequently are frequently spoken of as hexapod larvæ, there is no distinction of sexes at this stage; under favourable circumstances larvæ moult and develop into the nymphal stage. The nymphæ possess four pairs of legs, but are still sexually immature; the

nymphæ in turn moult several times and develop into a fully matured male or female parasite which are ready to continue propagating the species; the process of moulting is technically known as ecdysis. There are three principal varieties of acari causing skin disease, viz.:—

Sarcoptic acari.
Psoroptic acari.
Symbiotic, which will be considered in order named.

Sarcoptic Acariasis.

Sarcoptic acariasis affects the horse, camel, mule, and donkey, and is transmissible to man.

Description of Sarcoptes.—The sarcops has the general characters of the family to which it belongs, *Arachnida*, but differ from other members

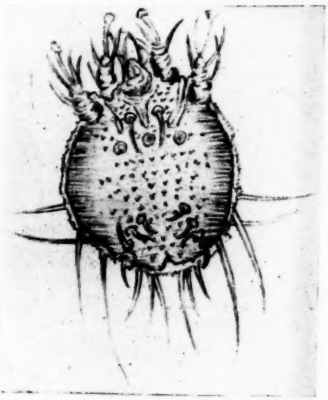

Fig. 3.—*Sarcoptes cameli*; dorsal aspect.

of the family in a few essentials which make the diagnosis of its presence, under a low-power microscope, an easy matter, and readily distinguishable from other members of this family which affects the skin of horses. The sarcoptic acarus is round or ovoid in body, has a short, strong rostrum with two cheeks. The four pairs of legs in the mature acari are short, strong and thick, and have ambulatory suckers on a long pedicle, the last pair of legs being invisible from the dorsal aspect. The male is destitute of copulatory suckers.

Habits of Life.—Live in patches in the early stage of disease in the vicinity of shoulders, flanks, withers, and inside the thighs. The males roam about amongst the epidermic scales, seeking for the mature female acari which, when fertilized, burrow in the skin, where the eggs are deposited in galleries, after which the female dies at the terminus of her burrow. The eggs hatch out, as a rule, fifteen to twenty in number, the females preponderating in the proportion of two to one, in from twelve to eighteen days, and the produce becoming sexually mature in seven days, when the brood begin to burrow. Therefore a minimum of three weeks constant treatment is necessary in this form of acariasis.

Symptoms.—The first symptom of the presence of the acari in a stud of horses is generally the attendant noticing small patches from which the hair is lost on shoulders or withers; the animal may show considerable pruritis, both biting and rubbing. The reason for this usually being the seat of the disease is to be found in the infection from saddle, although the animal will manifest pleasure on the application of the body brush, or even to the friction of the fingers to the part affected, evinced by the turning up of the upper lip. A careful examination of the diseased part will show the patch has rough outlines, and if gentle traction to the hair is exercised on the edges it will be found to come out in small patches; small raised papules will be felt under the finger, and if removed with the nail a tiny punctured wound is exposed, which may be moist or dry, according to the age of the lesion. These small punctures look as if the animal had been pricked with a needle, and surrounding the puncture the cuticle will be found pale in appearance,

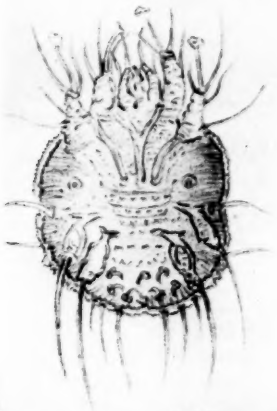

FIG. 4.—*Sarcoptes cameli*; ventral aspect.

a small blood-spot with a white circular zone. These small patches extend by a rapid amalgamation of the various infected centres, eventually invading the whole body, the animal becomes emaciated, the skin greatly thickened, corrugated and excoriated by the teeth of the animal, leaving wounds and abrasions, and at the base of the corrugations a fœtid, soapy material exudes. Diagnosis is readily carried out by the presence of the above-mentioned lesions. Careful examination of deep scrapings of the lesions under a low-power microscope may reveal the acari possessing the characteristics already described of the *Sarcoptes*.

At this point, I may state, I have known many veterinary surgeons, both in the Army and in civil life, who either could not or would not recognize mange, but treated the disease in a perfunctory manner. One regiment of dragoons carried the disease from York to Edinburgh, to Dundalk and on to Dublin, and from there they went to South Africa, and during the whole of that time (ten years) the disease was never

reported as scabies, and was always present, infecting the stables they had occupied. When in a subordinate position at the Curragh Camp I remonstrated with the senior officer, and he laughed at the idea of the disease being mange; he called it eczema. The day following his departure, when I was left the senior veterinary officer, I reported 280 cases in the camp, and my diagnosis of the presence of the parasite was confirmed by the Director-General and Principal Veterinary Officer in Ireland. Although the disease is not readily transmissible to man, during this same attack I sent many men to the hospital to be treated, having numerous small punctures on the forearm, legs, and chest; these men attended hospital every day and were, as a rule, cured within a week. A few, although affected, did not attend, and these men

FIG. 5.—*Psoroptes communis var. Equi*, female; dorsal aspect.

cured themselves with the dressings used for the horses. One farrier sergeant of a dragoon regiment informed me his wife and child could not sleep at night for itching; he himself had mange on his arms and chest; I made up some dressing which he cured them with.

Although the acari burrow in the human subject and can even lay eggs in the burrows, which in time hatch out, yet, owing to the absence of hair and the intolerable itching, and the ready means man has to wipe or wash away any irritating body, the acari can rarely be left alive over the nymphal stage of its existence. However, I firmly believe if there was no interference with the parasite, and in a favourable position, copulation would take place and the species propagate.

Regarding the transmissibility of the *A. equi* to the camel I have no experience, as a horse has a deep objection to going near a camel so

the chances of contagion are very remote; if possible, no horseman would even tether a horse on a place known to have been occupied by a camel. From my own experience I rode a pony frequently amongst camels affected with scabies with no ill effect.

Sarcoptic acariasis of the camel, discovered by Paul Gervais in 1841 (to science), is somewhat different from that affecting the horse; it is larger, and more easily found with the aid of a small magnifying glass. I have seen the epidermic scales, collected from a subject, seething with the acari; the parasite is of a lighter colour and slightly larger than *S. equi*. Figures of *A. cameli* are shown, sketched after Lombardini.

The symptoms in the camel vary little from those of the horse, except that the camel is usually attacked at the beginning of the disease

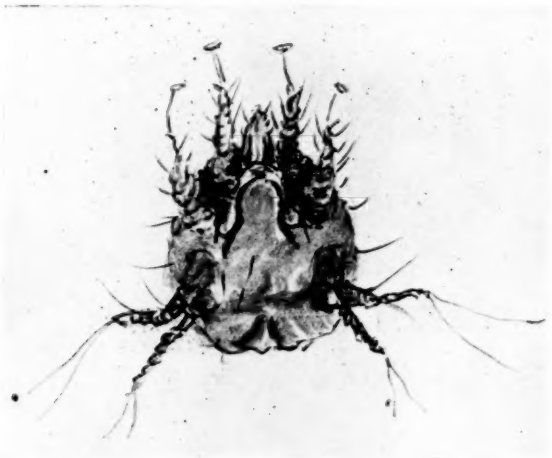

FIG. 6.—*Psoroptes communis var. equi*; ventral aspect.

on the inside of the thigh, scrotal region and flank, and in bad cases it may extend all over the surface of the body. This animal, from the want of succulent food, suffers from an eczema which denudes the whole body practically of hair, at the same time causing a certain amount of irritation. This disease is readily distinguished from the parasitic disease by the loss of hair, generally commencing on the shoulders, back, and neck; there are no pustules, nor is the parasite to be found.

I once saw some camels in the Bombay command placed under treatment for the parasitic skin disease, and they had been dressed with a strong solution of hydrarg. perchlor., when a few doses of oil internally would have cured them. A camel suffering from mange rapidly loses condition, and owing to the heat in the countries they inhabit, the acarus finds a suitable temperature for its existence and rapidly spreads. The animal suffers quickly from loss of condition,

owing to the irritability of the skin, for neither by night or day does the poor beast get relief.

As regards the transmissibility of the *A. cameli* to the mule or ass, my experience shows that where camels suffering from scabies have been working on the same lines of communication as strings of mules and donkeys (which have no great objection to the camel) scabies has not been prevalent in either; in fact it was a rare occurrence to find these animals affected.

As to the intercommunicability of scabies between camel and man, I can distinctly say this is frequent, as the camel men are generally subject to the same predisposing causes; they herd together in close proximity to their charges, always living in a state of uncleanliness and frequently making use of the blanket at night to keep themselves warm.

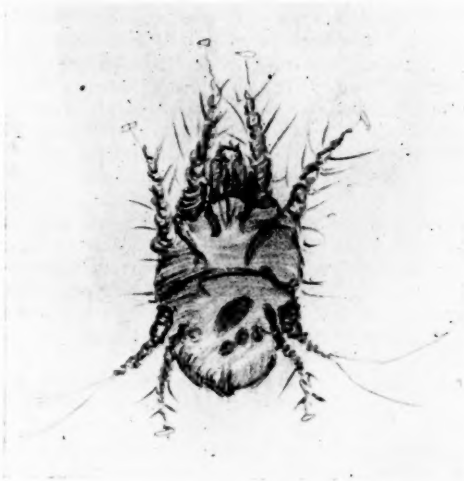

FIG. 7.—*Symbiotes equi*, oviparous female; ventral aspect.

I was sent to Sibi, in the Scinde Province of India, to report on some 100 camels being treated for scabies; on my arrival I found the most primitive means and ignorance prevailing to effect a cure of these animals. Some were emaciated and dying, and all practically in various stages of the disease. I examined the forty serwans (camel men) and found their bodies covered with small blood spots where the acarus had punctured the skin, and in my opinion the acari, under the conditions in which they found the human host, would have copulated and propagated the species. I found these men took the body brushes used on the camels to their sleeping places and used them freely during the night on their own bodies to allay the itching. I placed them under treatment, and understand they were cured in about three weeks.

Mange in bovines is extremely rare, and although in camps where scabies has existed in the horse, camel, and mules, and the bullocks

have frequently been in the same lines, I have never heard of any instances where it has been transmitted to the latter.

Sarcoptic Acariasis as Affecting the Mule and Ass.—The mule on field service is an animal which, as a rule, is under the immediate care of men capable of looking well after hygienic conditions of the animal, but as in the Tirah campaigns, where upward of 1,000 were used, many were left to the tender mercies of men barely capable of looking after themselves, and it was remarkable, in spite of the mules' long coats and loss of condition, what little skin disease there was amongst them. These animals worked with transport ponies, in fours, coupled by a rope from head collar to saddle, many convoys being

FIG. 8.—*Symbiotes equi*, male ; ventral aspect.

made up equally of ponies and mules. Although there was a considerable number of cases amongst the ponies, one rarely found the mules affected, and amongst this variety of animals the jennet appeared to be the most susceptible. I could only surmise the mule was less susceptible than the horse to contagion. Donkeys, in my opinion, are extremely resistant to the sarcoptic, but frequently affected with the psoroptic variety ; this may be due to extra thickness of skin.

Symptoms of *S. acariasis* in the mule and donkey differ but slightly from that of the horse, but, as I have stated, these two animals have a tougher skin and are not so irritable as the horse, and when a case comes before one's notice it will be found a great deal of the hair, although retaining its position, is undermined by the parasite and large patches can be removed by friction and traction.

Psoroptic Acariasis.

The parasite, *P. acarus*, has an oval body sometimes constricted about the middle; rostrum long and tapered and destitute of cheeks; the four pairs of legs have long pedicles with ambulatory suckers, and all are visible from the dorsal aspect. The sexes are distinguished by their legs and general shape of the body, by the genital apparatus and size; the male has copulatory suckers, being smaller than the female.

Habits of Life.—Remain on surface, piercing the skin to obtain juices; as might be expected by their long legs, are active wanderers, and found over the whole body where the hair gives them protection, as along the back, neck, and croup. The eggs hatch out in about six days. As to the duration a stable can be infected, in the Curragh Camp there was an old disused stable which became occupied, and most of the animals within a few days were showing irritation of the skin, and the psoroptic acarus was found on them. It was afterwards found out that mangy horses had occupied it six months previously.

Psoroptic acariasis affects all the domesticated animals, especially those used in transport purposes. The *P. equi* affects the horse during all times of the year, but is most frequently seen in the winter months, when the horse has his winter coat, and the grooming utensils do not reach the cuticle; also when the horse is debilitated by disease and overwork, or even standing in a stable, if exposed to infection, the disease will make active progress if left unattended. When I write on the symptoms of the disease I will mention how rarely this disease is diagnosed as psoroptic acariasis, but simply classified as mange, and the same vigorous methods taken for its cure.

The mule and ass are frequently the hosts of the *P. acari*, probably owing to their carrying a long coat which harbours the parasite, but these animals are not of the same nervous temperament as the horse, and the disease does not distress them to the same extent. The mule and ass make great use of the hind foot to allay the itching of the head, neck, and shoulder, and their readiness to roll in the sand and dirt is almost diagnostic of the disease in these animals; it appears to be their method of removing any irritating matter on the skin, for as a rule it is the first thing a mule or donkey will do on reaching camp after a march, when no doubt the perspiration gives an uncomfortable feeling to the skin. The animal rolls and gives himself a good shake; by this means, no doubt, the mule or donkey removes the moisture from the skin, and the parasite does not find much inducement to travel over a surface covered with fine particles of sand. When the disease is noticeable in the mule or ass it will be found on the upper surface of the neck, near the crest, along withers and back, and root of tail. In animals that have lost condition through work or want of food the skin will have lost its suppleness, and rolling will be of no avail in the hollows and undulations, and where the animal is not in a position, from the nature of its work or situation, to avail itself of this method of allaying the irritation, the disease will spread and the animal will show the symptoms as in the horse, but greatly exaggerated.

Psoroptic Acariasis of Camels.—I see writers on acariasis of the camel do not mention this disease, but from my experience of a cargo of camels (120) which arrived at Karachi from Aden I am led to believe these animals are affected. On examination they were found to be

suffering from severe rope-galls, having been tied down on the ship's decks with ropes round the hocks and forelegs, and practically had not moved for three weeks from this position. I found many of these animals suffering from an irritating skin disease. On examination of the scales of epithelium collected at the base of the tail, I found, with a magnifying glass, an acarus with apparently long legs, slightly larger than the Sarcoptic acarus. I learnt from the men on board, the first day out in the Indian Ocean, these animals were found to be biting themselves and to keep them cool and allay the itching sea-water was sprayed over them from a hose pipe. This parasite, in my opinion, was the P. *acarus*, for with a few simple coal-tar dressings, after clipping and washing with soda and soft soap, the animals were cured. I regret I did not make a drawing, but these animals had to travel into the interior, a cure had to be readily made, and circumstances were not propitious for carrying out microscopic examination. The parasite appeared slightly larger than that of the horse, lighter in colour, and the legs noticeably long. They caused great irritation to the skin, and were found to be readily killed by mild applications of parasitides. The psorops of this animal, as in other domesticated animals, prefers to live on the upper surfaces of the body, and the seat of the parasite enables one to distinguish this form of infection from that of the sarcops, but as the parasite makes rapid headway if left unattended, the body will soon be denuded of hair, and the seat of infection as a diagnosis will be lost, as the parasite would wander quickly over the invaded animal and propagate in a rapid manner in the warm climate of India and Africa.

Psoroptes bovis.—The sarcops is said rarely to attack bovine animals, the psoroptic variety readily does, and although there are no distinguishing features between those of the equine species and the bovine, according to experiments it has been found practically impossible to infect one from the other. The bovine species are invariably attacked on the neck and shoulders in the first place, and the lesion spreads along the upper surface of the backs. In the animals of transport this disease is well recognized and readily cured with mild applications of parasiticides after washing with soap and water, but in the colder parts of Northern India and in the hills, where the coats grow longer and the attendants think more of their own warmth than the hygienic condition of their charges, the psoroptic acarus makes headway and is found along the back to the root of the tail, and owing to the constant irritation the animal rapidly loses condition and coat. Those animals used in the bullock-carts will be seen to make ready use of the yokes and pole to allay the itching, and in the lines the hind foot acts in a like manner. The parasite is readily found in the epidermic scales, or at the base of a tuft of hair pulled out from the infected area.

Symbiotic Acariasis.

Symbiotic acariasis affects the horse, camel, ox, mule, and ass.

Description.—The Symbiotes possess some of the characteristics of both the Sarcoptes and Psoroptes. The body will be found round or ovoid, with a short, thick rostrum, powerful mandibles, and has four pairs of long, thin legs, short pedicle with ambulatory suckers, visible on the dorsal aspect. The males are notched posteriorly.

Habits of Life.—Lives in groups on surface, causing intense irritation especially during the night or in hot weather; during the day found on the legs, and in the mane, tail, and base of ears. On the horse's legs it has been said to have caused grease; probably its presence was only coincidental with grease. When in the tail of a horse it has often given rise to the animal receiving vermifuges as a cure for worms. This parasite is frequently the cause of a horse having a ragged main through rubbing the head under a manger to allay the irritation. When on the legs, gives rise to itchiness and has frequently been the cause of a broken shoe through stamping. This parasite is most frequently found on the horse, mostly on those parts of the body and extremities which give it cover, such as the legs, mane, and tail. The acarus at times causes great irritation, and in chronic cases changes in the dermis, as frequently seen in horses with long hair about the heels. The animal indicates the presence of the acarus by rubbing one leg against another, causing, in some cases, lacerations of the tissues with the calkin and clinches of the shoe; mostly found on hind legs. In the mane the symptoms indicated by the horse getting its neck under the head-rope or collar-chain, or under a manger, to allay the itching, is indicative. In the tail the animal will rub against any tree or post or even against another horse. When in the ears the animal will rub the ear against anything convenient, and on examination of all these parts infected, the *Symbiotes acari* may be found to confirm the diagnosis.

In camels, this animal is continually rubbing its legs and feet against the opposite members, in some cases causing raw patches. Between the digits will be found the same alteration of structure of the dermis as in the horse in chronic cases. The ears are frequently affected in the camel, although the affection is not recognized by the native serwans as parasitic. From the continual rubbing with the hind foot, in some instances a large suppurating sore may be set up about the base of the ear.

The mule and ass are affected as in the horse but the injury is generally confined to the tail, neck, and ears, and gives rise to little inconvenience to these animals.

Symbiotes bovis.—This parasite in the bullock is chiefly found at base of tail and rarely extends from that seat. There is the usual itchiness, hair falls off, scurf accumulates into crusts and may crack. The disease rarely causes any interference with health unless neglected and become extensive. The parasite may also infect the legs of bullocks, causing itchy legs, as in horses, with rubbing and loss of hair.

Treatment of Acariasis.

In describing the treatment of scabies in the various transport animals I shall confine myself to pointing out the differences in the treatment of the various animals, of the precautions taken, and the effect of the dressings. The treatment will consist in the primary motive of destruction of the members of the Arachnida attacking the animals and causing the disease of scabies. The same parasiticides will suffice for the destruction of all, and the difference in treatment will consist in the duration of the applications of the dressings and methods of application. The same precautions in all cases should be

observed of changing the "standings" and burning the litter periodically; of having no interchange of men from healthy to unhealthy horses; the grooming utensils should be disinfected and well washed out every evening, and all horse furniture, blankets, &c., should, as far as possible, be kept clean and finally burnt, as they will mostly be found wornt out and torn. Immediately there is a symptom of mange, an examination should be made of the affected patches and of scrapings from them to verify the suspicion or otherwise. The scrapings should be softened in a solution of caustic potash in a watchglass and then spread out on a glass side and examined under a low power ($\frac{2}{3}$ in. lens) of the microscope. Adult parasites, or larvæ, or ova, may be found. Inability to find parasites does not necessarily indicate that the condition is not acariasis, while, on the other hand, the discovery of one parasite, affords a positive diagnosis. After this has been done a careful examination of all the animals should be made, and if on the picketing rope all animals showing symptoms of mange should be isolated in lines, if space allows, 30 yards between each line, and fully 10 ft. between the horses, and the lines allotted to those animals according to the intensity of the infection. Daily examination must be made of all horses, and the attendants told to mark those showing irritation of the skin, and room must be left in the mange lines for fresh cases. A special site should be selected for the clipping of the horses infected, out of the wind, all hair to be collected and burnt, with special care; and men should be detailed for this purpose, and for the attendance of the horses affected at the rate of two men to four horses. The animals should, without delay, be lathered with soft soap out of the lines, and this should be repeated two or three times during the morning; the last wash over should be with chilled water, and horses well rubbed over with a wisp, which should be burnt every dry and fresh ones made. Care should be taken not to let the soap cake on the skin, as it causes blistering. If the weather is cold, blankets will have to be provided, for animals with scabies suffer from cold owing to general debility. In the use of the medicaments, one must regulate the strength according to the number of applications, as in sarcoptic; these have to be carried over at least three weeks, about twelve applications, whilst with the psoroptic variety two or three applications will suffice. The great aim, and where so many fail, is to get a mixture strong enough to destroy the parasite without injuring the dermis, not to cause cachexia by closing all the pores of the skin, and lastly, and not the least important, select a parasiticide which will not cause any deleterious effects on the health, such as hydrarg perchlor. Fourteen camels had to be destroyed in one camp from use of this drug, as it had produced mercurialism. The poisoning must have occurred as the result of absorption through the skin, as the camel does not use its tongue for licking very much. There is also a great deal to consider in the parasiticide and vehicle at one's command. In transport animals, oil as a vehicle is absolutely out of the question. In the Suakim campaign oil cost ten shillings a gallon, and then only procurable in small quantities. As it takes at least 4 gallons of oil to cure a bad case of scabies in the camel, and the camel is frequently 100 miles from the base of operations, one must find another vehicle; at the same time I do not believe in oil as a vehicle for scabies in camels, as they suffer from cachexia so readily. Mercurial dressings should not be used on the bullock,

as mercurialism is easily set up in these animals from absorption and licking. In my opinion the mercurial dressings are dangerous remedies in unskilful hands, and should be used more for the destruction of bacilli than animal parasites. As a general mange dressing for this country, it has been found, oil is easily procurable and used extensively in practice as a vehicle, but where one has hundreds to treat it is found impracticable as too costly. Jeyes' fluid and MacDougall's sheep dip were used extensively at the Curragh, but we found, if made up strong enough to kill the parasite and to be used three times a week, it hardened and cracked the skin; if made up too weak, it did not destroy the parasite. The formula used eventually—which I found the most serviceable—was the following, after washing the animals frequently in soft soap and Jeyes' fluid on the first day:—

Petroleum	2 pts.
Sulphur sublimate	½ lb.
Ol. picis	4 oz.
Water	1 gall.

Apply this dressing well over the affected parts in sarcoptic mange; the brushes are again rubbed over the horses in the morning (to wake the dressing up); this is left on for two days, when the whole is washed off with soft soap and hot water and the dressing applied again. This procedure is repeated for about four weeks, when the animals may be removed to the convalescent lines and carefully watched for signs of a recurrence.

In the camel I found the skin was very susceptible to any irritating parasiticide; they could not stand Jeyes' fluid or MacDougall's sheep dip. I found eventually sulphuretted potash, made as follows, a good remedy, and it has the advantage of being obtainable at a small cost:—

Slaked lime	1 lb.
Sulphur	3 lb.
Water	1 gall.

This is boiled about two hours, filtered carefully through muslin and applied warm. Mahomed said "tar was the remedy for mange," and where the disease is not general the animal can safely be treated with a mixture made thus:—

Tar, Stockholm	½ lb.
Sulphur niger	1 lb.
Soft soap	½ lb.
Water	add to make 1 gall.

The initial methods are resorted to as in the horse, but one or two washings with soft soap and hot water, without the Jeyes' fluid, is sufficient before the application of the dressing. All animals suffering from sarcoptic mange should have nourishing, stimulating diet; green food, if obtainable, should be given, and if not procurable an allowance of 2 oz. of ol. lini should be given daily; or in India, where sugar is easily obtainable, 2 oz. of sugar per day as a stimulant. Mineral tonics should not be given as deranging the digestive apparatus; the bowels kept open by exercise, and bran diet when necessary. In the camel, grazing should be given if procurable, even on the scrub or camel thorn; if these are not procurable, Mussauls (pills) should be given of sugar, black pepper, and barley meal, with plenty of daily exercise.

Psoroptic Scabies.—In this form of scabies remedies may be chosen which will have to be applied three times to effect the cure, after the washings have been performed, as in the treatment of sarcoptic, and the same hygienic conditions carried out as to segregation and clipping, which, if in the early stages of the disease, need be no more than on the parts affected, with a little margin. Creolin 1 in 30 is sufficient to destroy the parasite, and if applied three or four times is sufficient to cure the disease. If the animals are washed with Stockholm tar and soft soap in the proportion of 3 to 1, left on for one hour and washed off in warm water, this will be found to effect a cure in three or four days. The above remedies apply to all the transport animals, but I should recommend the tar and soft soap in the affected camel.

Symbiotic.—The seat of the irritation will demonstrate where the remedies are to be applied. The animals should be well washed over with a solution of Jeyes' fluid 1 in 20, with a good lather of soft soap, and this should be left on the affected parts until nearly dry, and washed off with warm water, and the same routine performed for three days, when a cure will be effected.

LOCAL ANALGESIA.

BY ARTHUR E. BARKER, F.R.C.S., PROFESSOR OF SURGERY AT THE UNIVERSITY COLLEGE MEDICAL SCHOOL AND SURGEON TO THE HOSPITAL.

THE following essay, published at the request of several friends on the teaching staff of the Royal Army Medical College, is intended to be a second edition of one which has already appeared in the *British Medical Journal* of December 24, 1904, now out of print, and must necessarily contain much familiar to those who have read the first edition. The latter, on re-perusal, seemed to me to need expansion and some pruning in order to bring it more up to the needs of to-day, and to make it more practically useful to those who are seriously endeavouring to replace the more dangerous methods of general anæsthesia by one which has really no risks if properly used. It seemed better, therefore, to recast the matter contained in the first paper without in any way altering its principles; and it is hoped that this may have increased its value, at all events to beginners in the study of this procedure. The history of the subject was briefly sketched in the first edition, and may be omitted here to save space, but I think it is worth study by all who wish to avoid the errors of earlier experiences.

ANATOMICAL.

The fundamental principle which underlies all local analgesia produced by the injection of various drugs, is based upon the discovery by Corning, in America, in 1885, that certain substances applied to the branch of a nerve suspend its sensory functions over its whole distribution for a considerable time. His experiments, conducted first with cocaine, have since been repeated with many other bodies, among which may be mentioned tropacocaine, β-eucaine, stovaine, novocaine and alypin, and have given similar results. His conclusions have received further support from Bier's demonstration on himself and others, that these substances brought into contact with the roots of the

spinal nerves, or the cord itself through the lumbar sac, suspend all sensory functions below the roots affected, or the segments of the spinal cord reached by the drugs. Local and spinal analgesia are, therefore, in principle the same, and only differ in the anatomical spot at which the drugs are applied to the nervous structures; in each case sensation is lost below the drugged nerve area. In the procedure of local analgesia, then, it is of prime importance to study the distribution of all the sensory nerves going to the actual field of operation and its neighbourhood; and it must never be forgotten that most parts of the body receive their nerve supply from more than one branch, and many from several having a very different origin. This is best illustrated by a familiar example.

In the operation for the radical cure of an inguinal hernia we have to consider the innervation of the skin, the muscles and their tendinous expansions, the cord and the peritonium, not only of the sac itself, but also of that part of the serous membrane surrounding the neck, which is sure to be dragged upon, more or less, during its separation and ligature.

Again, in the neck, supposing we are about to remove a thyroid tumour or a packet of glands, we have to consider not only the skin incision but also those deeper parts to which our operation will extend. It will be necessary, therefore, so to place the injection as to bring it in contact with most of the nerves of the cervical plexus at points well above the field of operation. This will be referred to later under the heading of technique. Some surgeons, to judge from their writings and utterances, appear to be doubtful of the possibility of rendering the deeper tissues insensitive, but they are among those who habitually employ the stronger solutions, which can only be used sparingly, whereas weaker solutions with an admixture of adrenalin can be injected widely, and reach in the various planes to the trunk and finest filaments of all the sentient nerves of the part.

But a more useful illustration than either of the above may be taken from the hand or foot. Here in operations on the fingers or toes we are able by infiltration at their bases at various depths to bring the injected fluid into contact with all the nerves supplying the members, so that these are rendered completely insensitive without any actual infiltration of the part to be operated on. In all these cases enough of the drug in a diluted condition must be injected at various depths to render the escape of any one nerve improbable.

Again, for the removal of a portion of rib for the evacuation of an empyæma or of a liver abscess the infiltration must not only be directed to the skin and muscles but also to the nerves above and below the bone and the periosteum on both its aspects. In these cases it is the periosteum, especially if inflamed, which requires the most complete saturation at a point well above the area of operation.

Pharmacology.

Without going into the merits of the various substances which are employed for local analgesia by infiltration, I shall deal with that one which is most familiar to me, and which has yielded results in the hands of many surgeons unsurpassed as far as I have read, seen or heard of.

β-eucaine (hydrochloride of benzoylvinyl-diaceton-alkamin) has long been known as a synthetic product allied to cocaine, but far less toxic and almost, if not quite, as efficient for producing analgesia. It is soluble in pure distilled water at ordinary temperatures in the proportion of about 4 per cent. of the drug, but is decompounded by a very small trace of alkali. It can be sterilized by boiling without change, but for this hard Bohemian glass vessels should be employed, which do not part with the alkali used in glass making. Such solutions may be stored in stoppered bottles for a time, but are better made fresh. A 2 per cent. solution of β-eucaine freezes, I find, at 0·28°, which indicates that a 4 per cent. solution (if it were possible to make one at a low temperature) ought to have the same freezing point as the blood, 0·56°, and the same osmotic tension as the latter. But like all the analgesic compounds mentioned above, β-eucaine is markedly hæmolytic and rapidly destroys blood-cells (and also presumably other tissue cells) placed in a 4 per cent. solution, just as stovaine, tropacocaine and novocaine do in their solutions, freezing at the same point as blood. This fact, apparently unknown to many, may account perhaps for the necrosis of the edges of wounds where strong solutions have been employed, which have been reported from time to time. But as I have never employed strong solutions, and have always added as much NaCl as would render them isotonic as tested by freezing, I have never, in hundreds of cases, seen any deleterious tissue-changes following on injection. One surgeon wrote to me saying that he had had gangrene of the fingers following on injection in some cases operated on before he had read my paper of 1904, already referred to, and that the reason was obvious, because the solution had contained from 10 per cent. to 15 per cent. of eucaine. Probably also the heat of the water which was necessary to dissolve so much as 10 per cent. of β-eucaine, operated also injuriously. In this case several factors were at work. First, the solution at 10 per cent. would be very hypertonic and therefore destructive if it could be tested by freezing; secondly, it would have to be very warm to dissolve so much of the drug; thirdly, sodium chloride was not used, and from his letter I gather that it required very forcible injection to infiltrate all he wished—there was therefore much tension of the tissues; and fourthly, there was the specific hæmolytic action of a concentrated solution of β-eucaine to be reckoned with. All this is avoided by using *very dilute* solutions of β-eucaine in normal saline and injecting them in great abundance at a wide distance round the area to be operated on, paying particular attention to the nerves supplying the part, which should be surrounded on all sides by the injected fluid. The need of stronger solutions is by these means avoided. In this way I have over and over again used close upon 200 cc. (7 oz.) of a *two per thousand* solution with the best results. These solutions should always contain, for operations lasting more than fifteen to twenty minutes, a small proportion of one of the adrenal derivatives. That which I have hitherto used has been adrenal chloride, which has the well-known property of causing contraction of the smaller vessels except those of the lungs whenever it comes in contact with them. The result of this is that there is an ischæmia all over the area infiltrated, which lasts for an hour or two, during which time the eucaine is probably taken up by the tissue-cells and its toxi-

city lowered or destroyed before it is parted with. The circulation in the part injected being thus enormously reduced, the β-eucaine is not washed away into the blood-stream or lymphatics so rapidly as without the adrenalin, and paralyses the sensory nerves. The paralysing effect is slower if adrenalin is used than without it, so that the surgeon has to wait half an hour or thereabout before operating. Indeed, the analgesia is usually more perfect about an hour after infiltration than half an hour after. For small operations, then, which only occupy about a quarter of an hour, the surgeon can dispense with adrenalin, especially if he uses a solution of 0·5 per cent. of β-eucaine in normal saline. But in this case one cannot inject so much of the solution, which, without adrenalin, is much more toxic than with it; probably not more than 40 cc. should be thus used. This is probably due to the fact, as already hinted, that the ischæmia produced by the adrenalin holds the eucaine so long in the tissues locally that is destroyed by the protoplasm of the tissue-cells, or if not that it passes into the general circulation so slowly as to produce no ill-effect. Be this as it may, it has been proved experimentally (Braun), that a dose of so powerful a drug as cocaine, which is capable of causing rapid death in an animal, may be injected without any injury if a small amount of adrenalin be added to the solution before use.

It must be remembered that the adrenalin chloride of commerce requires to be preserved as far as possible from light and air, exposure to which render it inert. Boiling also destroys adrenalin very soon, though not at once. For these reasons it should be only added to the solution of eucaine in normal saline when the latter has been boiled for sterilization and cooled to about blood heat. The rim of the bottle having been wiped clean and the stopper loosened, the requisite number of drops are dropped into the warm solution, the stopper is refastened and the bottle is replaced in its box at once out of the light. So used, a bottle of adrenalin chloride will last good and sterile, even in hot countries, for many months. If the contents of a bottle are seen to have become turbid or to contain a sediment, this sample should not be used, as it will be inert and possibly not sterile. Of the other adrenalin derivatives I have no experience, but there appears to be a prospect of their being replaced by synthetic chemistry before long. Indeed, a synthetic compound has already been produced for which it is claimed that it is identical with adrenalin or epinephrin in its physiological properties, and that it is more stable and uniform in strength and easily sterilised. If this is so, local analgesia will be rendered a much more certain and an easier procedure. I have only used it myself a few times, and have found its combination with eucaine exactly the same in action as that of adrenalin chloride with eucaine, I have also given a sample of the synthetic adnephrin to Captain Houghton, R.A.M.C., for independent observation at Millbank, and his report confirms my own experiences. In the cases in which we employed it there was the same blanching of the skin due to ischæmia and the same result as to prolonged analgesia as where adrenalin had been employed. The original synthetic solution does not require to be guarded from the action of light as does adrenalin. But, on the other hand, when added to the eucaine solution it undergoes the same colour changes to pink as does the ordinary adrenalin solution.

The solution which I have found most serviceable for general use is as follows:—

β-eucaine	0·2 gm.	= grains 3.
Sodium chloride	0·8 gm.	= ,, 12.
Distilled water	100 cc.	= oz. 3½.
= 1 pro mille adrenalin chloride...	0·5 cc.	= 10 drops.

The adrenalin is here in the proportion of about 1 in 200·000, on the estimate of 20 drops to 1 cc., which I have found to be correct as compared with a standard measure.

The most accurate and generally reliable mode of preparing this solution which I have been able to devise is the following:—Small hard glass flasks with a bent neck, containing up to a mark on the neck 100 cc. by weight of distilled water, are filled with the latter to the mark, and boiled over a spirit lamp for a few minutes for sterilization. To this are added 0·2 eucaine and 0·8 of pure sodium chloride, and the boiling is continued for a few minutes longer. The drugs, if carefully weighed, mixed and prepared in tablets are quite serviceable, but hitherto I have found the powder form accurately weighed, and made up in parchment papers more reliable. Some at least of the commercial tablet forms supplied to me have been disappointing, and other surgeons have had the same to report. But those tablets prepared for me by our pharmacologist at University College Hospital have proved entirely reliable. They were made in the special machine invented for the purpose, and were perfectly accurate as to the weight of each ingredient. Many of the ready-made trade solutions, sealed up in various-shaped glass vessels and containing the two drugs as above, are stated to be sterile. Whether this is so or not, they are often useless and sometimes dangerous. I have heard of sloughing following their use even in careful hands, and the injection of one sample, freshly opened, into my own arm, was followed by cellulitis. They are not to be trusted, and all solutions should be prepared fresh.

If in sterilizing the water some of it is lost by ebullition or evaporation, enough boiling water is added to it to bring it up to the mark on the neck before the drugs are added, when it is again cautiously boiled, the amount of water being always kept to 100 cc., *i.e.*, to the mark on the neck.

The flask may then be placed in cold water until cool enough for use, *i.e.*, at blood heat. Then the adrenalin or epinephrin (synthetic) solution of 1 to 1,000 is added, to the amount of ten drops, by loosening the stopper without removing it. It is then ready for use while still at blood heat. It should not be used at a temperature much above or below this, or its injection will cause slight stinging pain. When the adrenalin has been added the latter drug will only retain its blood-constricting properties for about an hour, and for this reason it should not be mixed with the eucaine solution until the moment before the injection. When once infiltrated the effects on the blood-vessels locally last, as a rule, about two hours, in some cases three. I have removed a recurrent nodule from a woman's breast two and a half hours after injection without the slightest pain.

Larger amounts of the eucaine solution may be prepared for use by careful sterilization and kept in stoppered bottles. But unless these are most jealously guarded against contamination, the fluid in them should be resterilized for each operation, and then little is gained by

the storage. The amount of eucaine injected with adrenalin at one sitting should not exceed 5 grains, although 6 grains have been used without toxic effects. Without adrenalin the maximum should be 3 grains in three and a half ounces of normal saline solution = 0·8 NaCl (=0·2 eucaine in 100 cc. water).

Novocaine may be prepared in precisely the same way in powders or tablets. My personal experience of it is limited to a few cases. The strength of the solution was 0·25 per cent. with 0·8 per cent. of sodium chloride in 100 cc. water. To this was added five drops of the synthetic epinephrin. The effect was in all respects the same as in the use of eucaine. Whether there will be any advantage in using novocaine instead of eucaine is not yet certain, but it is said to be less toxic, and stronger solutions could therefore be used or larger areas could be infiltrated if it be so. It can be boiled without losing its analgesic properties, just as eucaine and stovaine. It is stated that when the synthetic epinephrin is added to novocaine the latter is increased in power, and not only this, but novocaine seems to increase the constrictive qualities of the epinephrin. So far as the latter point is concerned my own brief experience of the synthetic epinephrin seems to show that five drops of it are enough for 100 cc. of the novocaine solution, instead of ten of adrenal chloride.

Technique.

For the infiltration of the fluid described above very simple syringes and needles are required, which should both be set apart for this special procedure, and for it alone. They should all be sterilized by steam or boiling in water without any alkali, any trace of which left in them would spoil both the eucaine and adrenalin. There are also objections to sterilization by carbolic lotion and spirit. But needles can be sterilized in spirit, which does not spoil their points or fine polish, or corrode their inner surface and so choke the finer ones. Any trace of spirit in them is washed out with the first few drops of the injection, expelled with air bubbles before use. After use the needles should be washed free of the solution, which, as it contains common salt, rusts them otherwise. After this it is well to wash or keep them in spirit to remove the moisture from without and within.

The syringe which I have found most convenient is of glass and metal, and if placed in tepid water and brought gradually to the boiling point rarely cracks. The piston is of a vulcanite compound which shrinks on drying, and requires boiling to restore it, but otherwise it is serviceable. I have also found Braun's syringe with asbestos piston very good. Major Porter, D.S.O., R.A.M.C., who has had a large experience in local analgesia, has expressed himself not quite satisfied with these glass syringes, as liable to crack when boiled, and states that he finds an all-metal instrument more suitable. In some respects this certainly ought to be so, but an all-metal syringe used with saline fluids would be likely in time to be corroded inside, both as to piston and cylinder, and unless very carefully cleaned and put up with both these parts separate, would, I think, often be found to jam unless lubricated, which would hardly be admissible in this case. On the whole, probably well annealed glass will prove the best, and the syringes mentioned above are usually supplied with spare glass cylinders. The "Record Syringe," too, with glass cylinder and metal

piston, is a beautifully made and accurate instrument, which may be used for infiltrating, and if treated with care in boiling may last a long time. The best size for a syringe for local analgesia is 10 cc. A larger one which I have used requires so much force as to tire the hand of the operator, and in tough tissues is almost impossible to use.

The finer needles are of the patent Freienstein pattern and are very easily obtained. They are fixed in a curved holder and cap. But for the deeper parts where the areolar planes or muscles (of the abdominal wall for instance) have to be penetrated, a long blunt needle which will not enter an artery or vein or injure a nerve must be used. Such a needle, 5 in. long, has been made for me, and is supplied with the first syringe alluded to above. Its end is closed and rounded, and it has a lateral eye. It can be fixed at any length in its straight receiving tube, which fits on to the syringe. The cap which I devised has internally a rubber washer which, when screwed upon the inner tube, fixes it water-tight by pressure on the rubber. After use it must be removed from the rubber, cleansed, and put away dry with its silver-wire stylet. The rubber will act on the metal if this is not done. The washer may be made of a $\frac{1}{8}$ in. section of a soft Jacques catheter. As this needle is quite blunt, a puncture in the skin must be made for it to give it admission to the deeper tissues, through which it will pass quite easily. The puncture is best made with a straight Hagedorn's suture needle after the skin has been injected. In using it beneath the cutaneous structures it is pushed obliquely across the course of the nerves supplying the area of operation, or transversely to them, while the injection fluid is forced out slowly and steadily. The track of the needle should in the first case cross the nerves on the cephalic side of the field of operation, and should go through successively deeper layers with each thrust. But it is better besides to aim at infiltrating the whole area involved in the dissection of the deeper parts, so that no nerve shall be likely to escape, for it is next to impossible to infiltrate each nerve separately. Thus in the operation for the removal of the appendix, besides the infiltration of the skin, muscles, and anterior parietal peritoneum, the needle should be thrust along the crest of the ileum behind the cæcum, and 10 to 20 cc. of the fluid be distributed there. The actual injection is done as follows. The syringe is filled from the bent end of the flask, which is half inverted, so that the curved part is always full. Then the needle-holder is fixed on it, turned upwards, and all air expelled. A beginning is made on the skin by thrusting the fine needle fixed on the nozzle of the syringe into the superficial part of the true cutis over one end of the proposed incision. The fluid is then forced *slowly* out until a white wheal about the size of a shilling is formed. Into the distal side of this patch the needle is again thrust in the same direction, and another wheal is formed, and so on, until the whole line of incision, with something to spare at each end, is converted into a white raised ridge. After the first puncture no pain should be felt, as each successive entry of the needle passes through an area already insensitive from distension before the action of the drug has commenced. This distension analgesia merges gradually into that caused by the drug. All subsequent punctures can be made through some part of the anæsthetic strip. Then in an operation of any magnitude it is necessary to use the long blunt needle, which is entered through a puncture made with the Hagedorn's needle

at the cephalic end of the wheal. Through this the blunt end is entered, and the long needle is pushed still further in a proximal direction, the injection being forced out as it traverses the subcutaneous tissues. It is then withdrawn, but not completely, and pushed obliquely across the track of the nerves leading down one side of the line of incision, and then again on the other. When the syringe is emptied thus, it should be detached from the needle-holder without withdrawing the needle from the tissues, re-filled and re-attached, and so on, until all the infiltration that can be done from one puncture is completed. If necessary, then a new puncture may be made for the deeper infiltration, but as the needle can be drawn out and fixed to 5 in. this is not often wanted, as most of the field of operation can be reached with it by passing it in different directions from the first puncture.

The only thing now remaining is to cover the area of operation with a sterile covering and wait for half an hour or so, when the amalgesia ought to be complete. There is another advantage besides in waiting. The injection of a considerable volume of fluid subcutaneously causes a mechanical œdema for a time until it is absorbed gradually. This œdema may embarrass the young operator, and more or less mask the anatomical details. At the end of half an hour it has mostly disappeared, and in an hour is hardly noticeable, and the surgeon cuts into blanched structures in which every detail can be seen, the more so as there is hardly any bleeding. It is sometimes supposed that reactionary bleeding is common after the use of adrenalin, but this is not my experience. I believe that where it has been seen it has been due to the fact that too much adrenalin was used, which has contracted some vessels for the time which ought to have been closed by forci-pressure, torsion or ligature. Where the dilution has been at or about 1 in 200·000 I have not seen it more frequently than under general anæsthesia, the larger vessels having been noticed and secured before closure of the wound.

The Preparation of the Patient.

Besides the most careful cleansing of the whole field of operation and its surroundings beforehand, as far as the patient's skin is concerned, other matters contribute much to the success of an operation under local analgesia. First, patients should not be in an absolutely fasting condition. They are better able to overcome the natural nervousness of facing an operation if strengthened by some light food, such as an egg and milk, or coffee, or alcoholic stimulant, half an hour before. Again, with somewhat nervous people, a hypodermic injection of morphia is very desirable just before the patient leaves the ward for the operating room. But the method should give way to general anæsthesia in the case of very excitable or nervous people, as also where children are concerned. Then it is well not to say too much to a patient about the infiltration or the operation. I generally tell them merely that we are going to squirt something into the skin so that they shall not feel. This is done with as little comment as possible, and a sterile wrap is put over the part to await operation. Just before the latter, the skin may be lightly wiped with a spirit compress, but not scrubbed or treated in any way with fresh antiseptics, which would produce hyperæmia. We have to bear in mind that the ischæmia

produced by the adrenalin compound is half the battle in local analgesia, and that we are dependent on it to a certain extent for the duration of the insensibility to pain. To destroy this ischæmia by friction or irritant antiseptics would defeat the object we have in view. Again, while operating there should be some screen or other device between the patient's eyes and the surgeon, which shall prevent his observing what is going on. This does not prevent the surgeon or his staff from exchanging an occasional friendly word with the patient on indifferent things, which may direct his attention from the matter in hand. Or he may be given a cup of tea or coffee, or be encouraged to smoke a little under circumstances. This latter might be considered a little too unconventional in a metropolitan hospital, but one can imagine it as permissible elsewhere or on a campaign, and I have certainly encouraged it among my private cases, and with every advantage to patient and operator.

Another matter worth emphasizing is that in operating the surgeon should avoid all dragging on the tissues as far as possible. It is perfectly obvious that a part may, after infiltration, be quite insensible to cutting or forceps, but that the parts around may be painful if dragged upon. The operator will, therefore, to obtain the best results from local analgesia, be obliged to cultivate a deliberate and delicate manipulation in such cases. And it is a comfortable reflection that the tissues will not suffer from this absence of violence, but be the more preserved in all their vitality.

After operations done in the above manner with eucaine and adrenalin, it is not necessary to keep patients in a recumbent position, as was the case with cocaine. Many of my patients have walked away after operation.

This paper is not intended to suggest doubts as to the benefits we all derive wholesale from the use of general anæsthesia. But we need no reminder that the latter has its drawbacks and risks, and from what I hear almost daily this method appears certain to play a most useful *rôle*, more particularly in the country and in the colonies, where skilful and experienced anæsthetists are not always at hand. In military surgery it has always appeared to me destined to be of the greatest importance. It has none of the risks of chloroform, and can be learned by any surgeon with a fair knowledge of anatomy. The drugs and small paraphernalia are very portable and stable; the patients are able to help themselves immediately after, or even during, the operation, and require none of that careful watching which is necessary during the recovery from chloroform, and in this way there is a great economy of hospital service. Moreover, there is an economy of hands in another way, for if there are several ordinary operations to be done one after another, the surgeon or an assistant can inject them all one after another, and then engage in the operations himself, taking each case in turn, knowing that the analgesia will, if properly done, last for from two to three hours.

Officers in the Medical Service know best what classes of cases they are likely to be called upon to deal with. But I can imagine many likely to be met with by them which are peculiarly suited for this method; and in the future I look for a wide application both of local and spinal analgesia in military and naval practice. My own desire has been from the commencement to render both these methods

simple, safe, and sure by careful observation, and by anatomical and physical study, so as to bring them well within the reach of that thoughtful branch of our profession for whom this paper has been written. It requires patience and experience to master the details of both methods, but it is already certain that these are not thrown away; and I am convinced from what has been achieved in the few years that both these methods have been employed, that far better and more widely useful results may be awaited from them in the future.

My own list of operations under local analgesia is too large to be given here. It includes two amputations through the knee-joint and some on smaller members, a large number of operations for hernia, inguinal and femoral, both strangulated and radical cures. Smaller operations for tumours, malignant and non-malignant, are also largely represented, as also the ligature and excision of varicose veins, both in the legs and scrotum. There can be no doubt that local analgesia has a wide application. It has already been largely employed in the military hospitals at Millbank, Woolwich, Colchester, and other places during the last three years, with the best results.

(Abstract from the *Journal of the Royal Army Medical Corps.*)

Clinical Articles.

A CASE OF MESENTERIC ABSCESS DIRECTLY FOLLOWING STRANGLES, AND TERMINATING WITH RUPTURE OF STOMACH.

BY CAPTAIN G. P. KNOTT, A.V.C., THE CURRAGH.

SUBJECT: Bay mare, aged six, a troop horse of the 18th Hussars.

Admitted to hospital on February 15, 1908, showing usual symptoms of strangles. The submaxillary glands were opened on the 20th; they contained a large amount of characteristic discharge. By the end of the month the wounds were quite healed, but the animal was found to be dull, inclined to be off her feed, and occasionally showing slight colicky pains, the signs of pain being sometimes much more pronounced; the most favourite position of the animal being fully stretched out as in the act of micturation. Mesenteric abscess was diagnosed at an early date, and various methods of treatment adopted, pot. iodid., carbolic acid, and arsenic all being given in large doses at various times.

During March the animal gradually became more emaciated, symptoms became more pronounced, and she was occasionally completely off her feed for a day or two at a time.

On April 14 she was completely off her feed, and in the afternoon of that day showed violent symptoms of colic. When lying down the forelegs were kept extended in front of the body. She was groaning, and eructations of gas were constantly emitted from stomach causing a loud noise. When standing the forelegs were kept well apart. I diagnosed rupture of stomach and gave large doses of morphia. Animal died at 3.30 a.m. on April 15. During progress of the disease, the animal's pulse respirations and visible mucous membranes were always practically normal. The temperature varied from 102°

to 106° F., nearly always being higher at night time, as recorded in the two recent cases published in the VETERINARY JOURNAL.

Post-mortem Appearances.—Carcase very emaciated, Thoracic cavity and organs therein were normal, bronchial and cardiac glands being especially examined. The abdominal cavity contained about 3 gallons of sanguineous-looking fluid. Parietal portion of peritoneum appeared normal; visceral portion covering large and floating colons appeared inflamed in patches. Suprasternal flexure of large colon was found adherent to the ensiform cartilage; the latter had to be cut away to allow of the colon being moved; third part of colon, near the pelvic flexure, was adherent to the abdominal wall. Stomach: a rupture, about 6 in. long, was found in the villous portion, which was intensely inflamed and contained small ulcers. Two ulcers about the size of a shilling were found in the cuticular portion, one of which had almost perforated the stomach wall; this condition evidently accounts for the rupture. The mucous membrane of small intestines showed chronic inflammation. Large intestines: The mucous membrane of large colon was intensely inflamed. A large abscess was found intact in the colic mesentery, which seemed thickened, shortened, and knotted in places.

The abscess weighed about 10 lb., the wall being about 3 in. thick, and contained about half a pint of inspissated pus with a stinking odour. Several of the glands of the colic mesentery were enlarged. An abscess was found in the pelvis of both kidneys. Spleen appeared abnormally small and round in shape. Other abdominal organs normal.

INGUINAL HERNIA OF A GRAVID UTERUS IN A BITCH.

BY G. H. WOOLDRIDGE, F.R.C.V.S., PROFESSOR IN THE ROYAL VETERINARY COLLEGE, LONDON.

THE subject was a wire-haired black-and-tan bitch, probably an ill-bred Welsh terrier, the property of Mr. N. She was brought in to the Clinique on February 3. There was a very pendulous swelling in the right inguinal region, which on examination was found to be a hernia of a horn of the uterus containing a single fœtus of large size. There was evidence of pain on manipulation, suggesting commencing strangulation. On making enquiries, it was ascertained that she was seven weeks gone in pregnancy. The owner agreed to have the bitch operated upon at once; so, as she was in as good condition for the operation as she was likely to be, she was chloroformed at once with a Hobday's pattern inhaler, assisted with a little chloroform on cotton-wool inserted into the mouth of the mask. The owner stated that he rather preferred that she should not breed again, so it was decided to remove the entire uterus, if it could be done through the one incision. The probability of this being possible was suggested by the fact that no further fœtus could be felt in the abdominal cavity on manipulation. The instruments, with the exception of scalpels, were boiled and transferred to a 2½ per cent. solution of carbolic acid, the scalpels being exposed for about twenty minutes to a 5 per cent. solution of carbolic acid, since boiling undoubtedly removes the sharp cutting edge. A solution of chinosol, gr. i. to water ʒi., was prepared for sponging. (As

a routine practice I avoid carbolic acid solutions for sponging operation wounds in dogs and cats, owing to its high toxicity for the latter and toy dogs, and though I often use it for instruments, I shake the solution off as I take them from the tray.)

After thoroughly disinfecting the operation area, an incision about 2 in. long was made into the hernial sac, but this had to be enlarged, as it was found impossible to get the distended uterine horn through. As much of the pregnant horn as possible was then drawn out, but the ovary could not be reached through the inguinal canal. Two ligatures of aseptic silk were then applied as high as possible (*i.e.*, as near the ovary as possible), and the cornu was cut between them. The left cornu was then secured by tracing *viâ* the uterine body, and as it was found to contain no fœtus it was easily drawn through the right inguinal canal and severed above in the same way as the right one. The body of the uterus was then drawn forward, ligatured in two places, and cut between. Previous to cutting the body the uterine ligament was torn, and several fairly large veins running through it were ligatured. A little gelatinous material was to be seen in the stump (the remaining portion of the uterine body). This was removed, but as it was sterile no ill-effects were anticipated. A lot of omentum persisted in forcing itself through the canal, so it was snipped off with scissors. The peritoneal layer of the hernial sac was then separated from the outer layers, and was ligatured with fine silk as high up (*i.e.*, as near to the external inguinal ring) as possible, and cut, the stump being returned to the abdomen. Three fine silk sutures were next inserted into the external inguinal ring, the skin wound closed with near interrupted silk sutures, and then sealed with flexile collodion, with which a little iodoform was mixed as it was drying. (Stock solutions of iodoform in collodion become very irritant.) No further support was applied.

The dog was kept in hospital five days, and was then allowed to go home. On re-inspection three days later there was very slight irritation, but no sign of moisture. The skin sutures were removed, and were perfectly dry. The part was again covered with collodion and iodoform, and on further re-inspection a week later (fifteen days after operation) all that could be seen was a faint scar.

During the whole time the bitch never missed a meal, the food for the first few days consisting principally of bread and milk.

RETENTION OF URINE IN A CAT, DUE TO SPONTANEOUS LIGATURE OF THE PENIS WITH FUR.

BY G. H. WOOLDRIDGE, F.R.C.V.S.

A PERSIAN tom-cat, aged 4 months, was brought in with the history that he had been in abdominal pain for several days, that he smelt offensively, and the suspicion that he was unable to pass his urine. He had a very anxious expression of countenance, and his pupils were widely dilated. On manipulation he evinced considerable pain, and a very much distended bladder could be felt. He was accordingly put on his back on the operating table, and the bladder was punctured through the abdominal wall with a sterilized fine trochar and cannula.

The urine appeared normal. No foreign body, as calculus, could be felt in the bladder, and it was concluded that this was one of those cases of spasm of the neck of the bladder so common in cats, and which rarely recurs more than once or twice if the distension is relieved by puncture. He was accordingly given a laxative in the form of ol. ricini and syr. rhamni āā ʒiss; while potass. iodid. grs. ii. and tr. hyoscyami ♏iii. were prescribed for him three times daily, with the application of hot cloths to the abdomen.

He was brought back again next day with his bladder again distended, and the puncture was repeated. On making a more close examination of his perineum, a very slight purulent discharge was seen from the sheath, and a little fine hair was protruding. This was grasped with forceps and drawn upon, this action extruding the penis, round which several coils of fur were firmly entwined. This ligature was removed, and the penis was seen to be badly lacerated, suggesting possible subsequent stricture. The perineum was advised to be fomented several times daily with a solution of pot. permang.

The next two days he took very little to drink—the effect of the potassium iodide and hyoscyamus—and he was then brought back with bladder distended. By pressure from the abdominal wall just a few drops of blood-stained urine could be squeezed from the penis, after which he passed a little urine normally. Much, however, remained in the bladder, and this was removed by trochar and cannula, as before. During the next few days he dribbled occasionally, but had to be punctured several times. The objectionable smell disappeared, and he got much brighter. His bowels were normal throughout.

With regard to puncturing the bladder of cats, I find it can be frequently repeated with sterile instruments with impunity. I usually seal the outer opening with a drop of collodion. In this particular case a little purulent moisture collected under the skin round one point of puncture. This was undoubtedly due to a contaminated instrument—a thing which one must expect occasionally when students are allowed to perform the operation, even under the strictest supervision.

The question naturally arises as to how this tight ligature became attached to the cat's penis. I believe it was due to the fact that he was just about attaining sexual maturity, and his long fur was drawn into the sheath as the result of erections of the penis, and became entangled by repetition. The cat was castrated a week or two later, when he appeared to have overcome the chief ill-effects of his previous illness. That is now three months ago, and as yet there appears to be no sign of stricture.

PROLAPSE OF INTUSSUSCEPTED COLON IN PUPPY.

BY G. H. WOOLDRIDGE, F.R.C.V.S.

The subject was a black mongrel puppy, aged 3 months, and about 6 lb. weight. A portion of his intestine was prolapsed, and was thought to be rectum. It was swollen and congested, but not lacerated. It was bathed and cleansed with a cold solution of creolin, and after manipulation with pressure it was returned through the anal

orifice. A finger was then inserted to see if all was straight, and it was found that the rectum was ballooned, and the returned body could just be felt by the tip of the finger. Manipulation through the abdominal wall also revealed the presence of a sausage-like body with which we are familiar in cases of intussusception. It was then decided to anæsthetise the puppy and reduce the telescoping, and he was accordingly put under chloroform. When anæsthetized the abdomen was again manipulated; no intussusception could be felt, but as its presence was so clear before the application of chloroform the operation was proceeded with after the necessary attention had been paid to sterilizing the seat of operation and the instruments. On opening into the peritoneal sac, however, and examining the contents no intussusception could be found, the only evidence of its previous existence being slight congestion of the peritoneum of the colon. The abdominal wound was accordingly closed by two rows of silk sutures, the buried row taking in parietal peritoneum and abdominal muscles, and the outer row through the skin only. It was then sealed with collodion and boracic acid.

Two days later the intussusception reappeared, and was protruding slightly. It was again returned, and a loose suture inserted across the anus. A draught was administered containing ol. ricini ʒss. and tinct. opii ɱ v., the latter to diminish peristalsis and tenesmus. He was fed entirely upon liquids. Next day, on manipulation, the intussusception had apparently reduced itself again. On the fifth day, after laparotomy, he was allowed to be taken home, being very bright and apparently doing well, although there was slight moisture of the abdominal wound. He was brought for re-inspection on the ninth day, and was apparently doing splendidly, no intussusception being discoverable, and so the anal suture was removed. Next day, however, he was brought back with the trouble renewed, and with a desire on the part of the owner for the dog to be destroyed. I persuaded the owner to give him another chance, and so the prolapse was returned, and a suture again inserted. I ascertained that it was found impossible to keep him from running up and down stairs at home, and that was probably the cause of the relapse, so I determined to keep him in hospital in a cage kennel. In addition to a bread-and-milk diet, he was given ʒii. of petroleum emulsion three times daily. This agent I find to be an excellent intestinal demulcent for dogs, keeping the bowels in a slightly relaxed condition, and diminishing tenesmus due to irritation without constipation. The sausage-like body was not discoverable again next day. This treatment was continued for several weeks, and the condition has not since recurred.

The extraordinary feature of these cases to me is the frequent occurrence of intussusception and spontaneous reduction. It seems to be due to irregular peristalsis set up by some superficial irritation of the intestinal mucous membrane, and this may be controlled by the use of petroleum emulsion if the prolapse be prevented by a loose anal suture. Most attempts to treat by excision when the condition is confused with prolapse of the rectum terminate fatally.

RUPTURE OF UTERUS AND PERINEUM IN A MARE DURING PARTURITION.

BY J. B. BUXTON, HIGHGATE, LONDON.

A FEW days ago I was called in to see a valuable chestnut hackney show mare, aged 7, 15.3 high. The message was that "the mare was due to foal that day, and had been straining during the night without any result." When I arrived at the scene of operations the condition of the mare was somewhat surprising. She resembled a solid oblong of flesh as she stood, with only a narrow strip of daylight under her. Unfortunately no camera was available, so actual measurements were taken. The under surface of the abdomen at the posterior part was 4½ in. from the ground, and the anterior part 7 in. The under surface of the thorax gradually sloped upwards from 7 to 16 in. The udder was right forward in line with a perpendicular dropped from the sixteenth or seventeenth dorsal vertebra. Each teat was large enough to fill an ordinary teacup, and a straw-coloured liquid tinged with blood exuded spontaneously. In mentioning the "udder" above I should have said "teats," as there was no vestige of an udder, the under surface of the abdomen being in a continuous line, and œdematous. The mare was showing evident signs of labour, but in her present condition the abdominal muscles were unable to help in the expulsion of the fœtus. On introducing my hand into the uterus I found a sort of *cul-de-sac*, and felt about for an opening. This I found in the floor of the cavity. The passage was very small, and it was with difficulty that I could get my hand through. When I did succeed in this I found that the long axis of the uterus, instead of being downwards and forwards, was vertical. In the depth I could feel the head of the fœtus, which was lying with its back towards the perineum, and in an almost vertical position, corresponding with the womb, with its head wedged beneath the brim of the pelvis, and struggling violently. As it appeared as though delivery would be a lengthy matter, I decided to strip and don suitable garments. Upon returning (in about ten minutes) I found both forefeet of the fœtus projecting through the perineum, about 6 in. below the vulva. I should have mentioned above that the perineum, seen from behind, extended in an almost vertical line from the vulva to the hocks. As the feet had appeared here, it was evident that the uterus was ruptured, and as the mare had cold extremities and a running-down pulse, and was showing signs of great weakness, besides passing quantities of almost pure blood through this new orifice every time she strained, I decided that, taking everything into consideration, the best thing to do was to obtain the owner's consent to destroy the mare, and complete delivery of the foal through this unnatural channel.

The owner's consent having been obtained, I shot the mare, and then, enlarging the opening, delivered the foal without mishap. The foal was abnormally large, and as it was likely to prove valuable the owner decided to rear it by hand, and up to the present it is doing well. On *post-mortem* examination I found that there was a large rent in the uterus, and the abdominal cavity contained a large quantity of deeply blood-stained fluid; the intestines were much injected, and the rectus abdominis muscle was ruptured at its pubic attachment. The mare had had a foal two years ago, and was unable to rear it, through lack of milk, and it had to be brought up by hand. Last year I saw a similar case in a cow, but the enlargement of the abdomen was not so great, in proportion, as in this case.

Abstracts and Reports.

NOTES ON PARASITIC NEMATODES, INCLUDING DESCRIPTIONS OF NEW GENERA AND SPECIES, AND OBSERVATIONS ON LIFE HISTORIES.[1]

BY BRAYTON H. RANSOM, CHIEF OF THE ZOOLOGICAL DIVISION.

I.—The Genera *Trichostrongylus*, *Ostertagia*, N.G., *Cooperia*, N.G., and *Nematodirus*, N.G., with Brief Descriptions of New Species.

In addition to the larger, more or less readily recognizable species of strongyloid nematodes occurring in the alimentary canal of ruminants, there are numerous small forms which, on account of the imperfect state of our knowledge concerning them, have received special attention in the course of an investigation of the nematodes of American ruminants. A study of a large number of specimens from various localities has shown that over a dozen species of these small strongyles are present in this country, some of which have been identified as species already described, and others as new species. They are discussed only very briefly in the present paper, but in a forthcoming article they will be described more fully.

Genus *Trichostrongylus* (Looss, 1905).

Before Looss (1905) issued his paper on *Trichostrongylus*, the small strongyles referred to above, so far as concerned the various species then known, were all grouped in the genus *Strongylus*. From this genus Looss separated the species *S. retortæformis*, *S. instabilis*, and *S. probolurus*, and placed them in a new genus *Trichostrongylus*, which included also the species *T. vitrinus*, newly described by Looss. With the exception of *T. retortæformis*, the type of the genus, which occurs in rabbits, all of the species mentioned occur in ruminants, and some of them also in other animals, including man.

The species of *Trichostrongylus* listed by Looss have all been found in ruminants in this country except *T. retortæformis*, which has been collected in this country only from a domesticated rabbit, and but once. Two additional species of *Trichostrongylus* have been found in America.

T. extenuatus (Railliet, 1898) = *S. gracilis* McFadyean, 1897, not Leuckart, 1842. This species, originally described from specimens collected from the fourth stomach of cattle in England, has been collected in this country from sheep, goats, cattle, and various other ruminants.

T. capricola, n. sp., from goats and sheep, United States. This species is of about the same size as *T. instabilis*, but is readily distinguished from the latter by the fact that the latero-ventral ray of the bursa is noticeably thicker than any of the other rays, whereas in *T. instabilis* the externo-lateral ray is usually thicker than the others. The dorsal ray proper is also quite different from that of the latter species, its branches being nearly equal in length to the stem. In *T. instabilis* the branches are very short and the stem relatively long. The spicules are of about the same size in both species, but differ in that their points are smooth in the new species, while in *T. instabilis* they are barbed.

[1] Forming Circular 116 of the Bureau of Animal Industry.

Three other genera formerly included in the genus *Strongylus* are represented by the lesser strongyles of American ruminants. These are here proposed for the first time.

Genus *Ostertagia*, n. g.

Type species: *Strongylus ostertagi*, Stiles, 1892, from cattle, Europe and America.

Important characters of this genus are the presence of cervical and prebursal papillæ; the two ventral rays of the bursa close together, with their tips in relation to a more or less conspicuous indentation of the edge of the bursa; the presence of an accessory bursal membrane attached to the dorsal end of the body near the dorsal side, inside the bursa; accessory piece of the spicules present or absent, inconspicuous if present.

Besides *O. ostertagi*, other species of this genus occurring in this country are *O. circumcincta* (Stadelmann, 1894). *O. trifurcata*, n. sp. From the fourth stomach of sheep and goats, United States.

O. trifurcata may be distinguished from *O. circumcincta*, which it usually accompanies, by the shorter spicules (150 to 180 μ), which are divided lengthwise in the distal portion into three processes, namely, two shorter, acutely-pointed processes and one longer, thicker process truncated at the end. In *O. circumcincta* the spicules measure 280 to 320 μ in length, and are divided distally into but two processes. The female of *O. trifurcata* has not been identified.

O. marshalli, n. sp. From the fourth stomach of sheep, Montana. This species has a large bursa 550 to 690 μ in width when spread out, with a long, slender dorsal ray (280 to 400 μ long) bifurcated 200 to 280 μ from its origin. The accessory bursal membrane is unusually conspicuous (65 to 75 μ long by 70 μ wide). The spicules are rather delicate in structure, 250 to 280 μ long, split lengthwise in the posterior one-fourth to form three terminal processes, two of which are slender; the other, less conspicuous, is shorter, broader, and thinner. Accessory piece absent. The eggs of this species are very large, 160 to 200 μ long by 75 to 100 μ wide, with a double shell; the outer shell is very thin and delicate, the inner slightly thicker.

O. occidentalis, n. sp. From the fourth stomach of sheep, Montana. This species has been found in company with the preceding species. The male is somewhat larger (12 to 16 mm. long) than the male of *O. marshalli* (10 to 13 mm. long) and the bursa is also larger (650 to 740 μ wide). The most conspicuous difference is in the spicules and in the presence of an accessory piece. In *O. occidentalis* the spicules are very strongly built, 290 to 320 μ long, divided lengthwise, beginning a short distance posterior of the middle, into three prominent terminal processes. The female of this species has not been identified.

Genus *Cooperia*, n. g.

Type species: *Strongylus curticii*, Giles, 1892, from sheep, United States.

This genus is characterized especially by its relatively thick head, the cuticle of which is annulated and often forms a vesicular swelling; by the absence of cervical and prebursal papillæ; by the peculiar conspicuous beaded appearance of the cuticle along the longitudinal lines; by the wide separation of the tip of the ventro-ventral ray of the bursa from the tip of the latero-ventral ray: by the peculiar branching of the dorsal ray into two prominent main branches curved

to form a lyre-shaped or horseshoe-shaped structure, each with a branch which originates near the junction of the main branch with the stem and extends ventrally in a vesicular swelling on the inner surface of the bursa; and by the absence of an accessory piece.

Besides *C. curticii*, the following species of this genus have been collected from American ruminants: *C. punctata* (Schnyder, 1907); *C. oncophora* (Railliet, 1898); *C. pectinata*, n. sp. From cattle, Texas.

C. pectinata may be identical with *S. ventricosus* Rudolphi, from *Cervus elaphus*, but it is impossible to determine this point until the type specimens of Rudolphi's species can be restudied. It may be readily distinguished from *C. curticii* and *C. punctata*, with which it is most likely to be confused, by the fact that the middle portion of the spicules has a prominent ventrally projecting curved edge with well-marked corrugations at right angles to the border, giving the latter a toothed or pectinated appearance, while the terminal portion of the spicules is relatively very slender. Furthermore, the spicules are larger, measuring 240 to 280 μ in length. In *C. curticii* the middle portion of the spicules forms a ventrally projecting edge, but this is less conspicuous than in *C. pectinata*, and the corrugations are less marked. The spicules of *C. curticii* are also smaller, having a length of but 135 to 145 μ. In *C. punctata* the spicules measure only 120 to 150 μ in length and are without corrugations.

Genus *Nematodirus*, n. g.

Type species: *Nematodirus filicollis* (Rudolphi, 1802), from the small intestines of sheep and other ruminants, Europe and America.

In this genus the ventro-ventral and latero-ventral rays of the bursa are close together, as are the medio-lateral and postero-lateral rays, the tip of the externo-lateral ray being about midway between the tips of the ventral rays and those of the medio-lateral and postero-lateral rays. Instead of one unpaired dorsal ray, as is usual in strongyles, there are two dorsal rays. The spicules are long and filiform, without an accessory piece. The eggs are large with rather thick shells, and the embryo develops to the ensheathed stage, or nearly to the ensheathed stage, before hatching. One species of this genus, *N. filicollis* (= *S. filicollis* Rudolphi), has been found to be a very common parasite in the various ruminants of this country.

II.—Observations on the Life History of *Strongyloides Longus*.—Infection Through the Mouth and Through the Skin.

It has recently been demonstrated by different investigators that infection with certain nematodes parasitic in the intestine may take place by the penetration of the larvæ through the skin. In some cases it has been shown that the larvæ enter the hair follicles, reach the lymphatics and blood-vessels, are carried to the heart, then through the pulmonary vessels to the lungs, where they enter the air-sacs, and then migrate up the trachea, and finally down the œsophagus into the stomach and intestine.

Looss and others have proved the occurrence of infection with hookworms in this way, and Van Durme (1902) observed that the larvæ of a species of *Strongyloides* found in an African chimpanzee readily penetrated the skin of guinea-pigs. Whether the larvæ might

finally reach the intestine and there undergo further development was, however, not determined. Recently Gonder (1907, *Arb. a. d. k. Gsndhtsamte.*, v. 25) has demonstrated that the larvæ of *S. longus* readily penetrate the skin of dogs. In his experiments, however, intestinal infection did not result, and the larvæ were not traced further than the deeper layers of the skin.

The common occurrence of *S. longus* (Grassi and Segré, 1887) in sheep at the Experiment Station of this Bureau, Bethesda, Md., has afforded an opportunity of testing the possibility of infection with this species through the skin, and a few experiments bearing on this point and on other questions in the life history have been carried out.

Some fresh fæces from a sheep, which was killed September 15, 1906, and found to be heavily infested with *Strongyloides*, were placed in a covered glass vessel and kept at the temperature of the laboratory. At this time the eggs of the parasites, present in the fæces in great numbers, were nearly all unhatched, but contained active vermiform embryos.

September 16, the eggs had hatched, and the culture contained a multitude of free rhabditiform embryos, not yet developed to the final larval stage. The following day some of this culture was fed to a rabbit. About two weeks and a half later (October 5), this rabbit was killed and the stomach and small intestine examined. No *Strongyloides* were found.

September 19, rabbit No. 2038, was fed with some of the culture. October 24, the fæces of this rabbit were examined microscopically, but no eggs of *Strongyloides* were found, nor were any worms of this species found when the rabbit was examined *post-mortem*, December 15.

September 22, rabbit No. 2037 was fed on some of the culture, and this feeding was repeated September 24, 25, and 26. October 24 the fæces of this rabbit were examined, and eggs of *Strongyloides* were found. The following day the rabbit was killed, and two adult *Strongyloides* were found in the small intestine.

September 22, a small quantity of the culture of sheep fæces was placed on the skin of rabbit No. 2039, and kept moist for one hour. The rabbit was kept under restraint during this time in order to avoid the possibility of getting any of the material into his mouth, and at the end of the hour 95 per cent. alcohol was applied to kill any of the larvæ which might be remaining on the skin. Additional applications of larvæ were made September 24, 25, and 26 under similar conditions. October 24, eggs of *Strongyloides* were found in the fæces of this rabbit, and eight adult worms were collected from the small intestine October 26, when the animal was killed and examined *post mortem*.

The worms collected from these rabbits were carefully compared with specimens from sheep, and they appeared in every respect similar, and were unquestionably of the same species.

The possibility of infection from sources other than the culture used was considered, but as other rabbits raised at the Bureau Experiment Station, like those used in the foregoing experiments, and kept under similar conditions after being brought to the laboratory, were free from infection with *Strongyloides*, ten to twelve having been examined with special reference to the presence of this parasite, it seems safe to conclude that the rabbits in the experiments became infected from the culture of sheep fæces which they received.

The probable explanation of the failure of infection in the two rabbits which were fed two and four days, respectively, after the fæces were taken from the infested sheep, is that the larvæ had not yet developed to their final ensheathed stage, and hence were not infectious.

These experiments show that *S. longus* is transmissible from sheep to rabbits, which may become infected either by swallowing larvæ which have developed in the fæces of infested sheep, or by the penetration of larvæ through the skin. At ordinary room temperature the larvæ in fæces from infested sheep develop to the infectious stage in about a week, and after being swallowed by rabbits or entering the body through the skin reach maturity within a month. The occurrence of infection in rabbits both by the entrance of embryos through the mouth and their penetration through the skin indicates that sheep may become infected in a similar manner.

III.—Notes on the Life History of *Trichostrongylus Retortæformis.*

In the course of an examination of the fæces of rabbits in connection with the experiments described in the preceding article, in order to determine whether the rabbits bred at the Experiment Station of this Bureau at Bethesda, Md., were infested with *S. longus*, the eggs of a nematode were found, which were apparently those of some strongyle. These eggs were thin-shelled, measured 85 to 90 μ long, by 45 to 50 μ wide, and contained embryos in the morula stage. The rabbit in whose fæces these eggs were found was being used in an experiment by another division of this Bureau, and was unfortunately destroyed without a *post-mortem* examination for parasites, so that the worms producing the eggs were not obtained. A culture, however, had been made of the fæces on November 1, 1906.

November 15, 1906, ensheathed embryos of a strongyloid worm were noticed on the inner surface of the bottle containing the culture, and on December 26, 1906, some of this culture was fed to rabbit No. 2046.

January 22, 1907, the fæces of rabbit No. 2046 were examined, with negative results.

February 8, 1907, another fæcal examination was made, and eggs similar to those passed by the original rabbit were found.

May 25, 1907, rabbit No. 2046 died, and was examined *post-mortem*. Several males and females of the species *T. retortæformis* were found in the small intestine.

The obvious conclusions from this experiment are that the original rabbit from whose fæces the culture was made was infested with *T. retortæformis*, that the eggs found in the fæces belonged to this species, that embryos hatched out and developed to the ensheathed stage within two weeks after the passage of the eggs from the intestine of the host, and that the embryos swallowed by the second rabbit developed to egg-producing maturity in the intestine in about a month after infection.

Although the possibility that the second rabbit became infested from some other source is not absolutely excluded, the fact that of ten or twelve other rabbits kept under the same conditions as rabbit No. 2046, none showed any infection with *T. retortæformis*, is additional evidence that the conclusions expressed above are correct.

The results of this experiment confirm those of Railliet (1889),[1] who succeeded in infecting a rabbit by feeding with the embryos of the parasite in question, and thus first established the fact that this species develops directly without an intermediate host.

The ability of the embryos of *T. retortæformis* to survive for a long period of time under favourable conditions is witnessed by the fact that many of the embryos in the culture made from the fæces passed November 1, 1906, were still alive at the date of the last examination, September 13, 1907, having survived more than ten months.

Reviews.

VETERINARY POSOLOGY AND THERAPEUTICS, &c. By George A. Banham, F.R.C.V.S. Third Edition. Pp. 236, 12mo. Published by Messrs. Baillière, Tindall and Cox, London. Price 2s. 6d. net.

THIS useful little book is so well known, especially in the British Isles, that it seems hardly necessary to say anything about it beyond noting the fact of a new edition in which the material has been brought right up to date. A number of very useful tables have been added, giving a large fund of information in a very concise, clear, and easily assimilable form for students, and for ready reference for practitioners. In addition to the tabulation of the various medicinal agents, showing their strengths and doses, the book gives a classification of medicines according to their actions on the different organs (after Garrod), and a therapeutical classification.

It is especially serviceable as a pocket companion to students preparing for the Classes C and D examinations of the Royal College of Veterinary Surgeons. For the former, the therapeutic, is essential, and so is hygiene, the study of which is assisted greatly by the tables of percentage composition of feeding stuffs, a list of grasses, and tables of œstrum, utero-gestation, weaning, thermometry, pulse and respiration, and dentition. Students of Class D will find the synopsis of diseases and their treatment very useful, and also the lists of parasites, external and internal.

Most of the doses given in the posological table will be found to work out well, but we should like to see the dose of morphia salts corrected for the dog. In this, as in most works on the subject, the dose is quoted as gr. $\frac{1}{8}$ to gr. $\frac{1}{4}$. As an emetic and hypnotic much larger doses may be given with advantage and with absolute safety. A small toy Pomeranian of 4 lb. weight will take gr. $\frac{1}{2}$ of morphine tartrate to produce emesis within ten or fifteen minutes, and to render him sleepy in thirty to forty minutes, while large dogs such as St. Bernards will take grs. ii.

In the synopsis of treatment a rather important omission is made in reference to chorea. The administration of tr. nucis vomicæ and potass. iodid. in combination is now almost the standard treatment

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[1] Railliet. 1889. "Développement expérimental du *Strongylus strigosus* Duj. et du *Strongylus retortæformis* Zeder." *Bull. Soc. zool. de France*, Par., v. 14 (10), déc., pp. 375-377.

for this condition, and should have been noted. We also observe a reference to "scarlatina" or "scarlet fever." We know of no such disease in any of the lower animals. Amongst the printed errors, *Strongylus cervicornis* is misspelt *S. urvicornis.*

In the list of domestic measures, we are glad to see quoted the correct capacities of the various spoons. A teaspoon is generally taken to hold 1 drachm, whereas the average teaspoon of the present day holds 2 drachms, and the dessert-spoon and tablespoons hold double the amounts they are generally considered to hold. This is a matter of very great importance, especially where a potent drug, such as as strychnine in tinct. of nux vomica or Easton's syrup, is being prescribed to dogs. In such cases double doses may have disastrous results.

The printing, paper and binding are very good, and, taken throughout, the book is really excellent value.

We are informed that a new edition of the standard veterinary work by Friedberger and Fröhner is now approaching completion. It has been entirely re-translated from the sixth German edition, and has been carefully revised by Mrs. Hayes, assisted by Mr. William Hunting. An article on Bacteriology has been added by Professor Hewlett, of King's College. The work will be in two volumes, and Messrs. Hurst and Blackett expect to issue it next month.

THE SOCIETY FOR THE DESTRUCTION OF VERMIN.

President: Sir James Crichton-Browne, J.P., M.D., LL.D., F.R.S.
Vice-Presidents: Sir Patrick Manson, K.C.M.G., M.D., F.R.S.; Surgeon-General A. F. Bradshaw, C.B., M.R.C.P.; Professor Simpson, M.D., F.R.C.P.; Sir Harry H. Johnston, G.C.M.G., K.C.B., D.Sc.; Sir Gilbert Parker, D.C.L., M.P.
Central Executive Committee: The Right Hon. Lord Avebury, P.C., D.C.L., F.R.S.; Wm. P. Aveling; Sir Rubert Boyce, M.D., F.R.S.; Edward Brown, F.L.S.; Sir T. Lauder Brunton, M.D., Sc.D., F.R.S.; Clement Godson, M.D., M.R.C.P.; W. Lawler-Wilson; Chas. Martin, M.B., D.Sc., F.R.S.; P. Chalmers Mitchell, D.Sc., LL.D., F.R.S.; John Murdoch, M.D., Ch.B.; Alex. M. Nichol; C. W. Saleeby, M.D., F.R.S.E.; Louis W. Sambon, M.D., F.Z.S.; F. M. Sandwith, M.D., F.R.C.P.; Sir Harry Stapley, Bart., F.S.A.(Ireland).

Objects of the Society.

The Society for the Destruction of Vermin was formed in January, 1908, to organize a national movement for the extermination of rats and other vermin noxious to man. Among the vermin included within the scope of the Society's operations are rats, mice, sparrows, ticks, fleas, mosquitoes and flies.

Menace to Public Health.

It stands amply proved by the testimony and researches of many eminent scientists that rats and other vermin constitute a most serious menace to public health. They foster and disseminate disease germs, and in many instances are the leading factors in disease epidemics.

Diseases Propagated by Vermin.

To cite a few examples :—

Bubonic plague is now known to be conveyed mainly by rats. In most recent outbreaks this disease has been noticed to occur first amongst the rat population of the invaded areas ; from these it passes to man by means of fleas, which inoculate him with the germs they have imbibed in feeding on infected rats. It is evident that the destruction of rats is an essential, if not the most important, preventive measure against plague.

Malaria is known to be directly conveyed to man by infected mosquitoes. The extermination of mosquitoes is being carried out very actively in numerous malarial districts with remarkable results.

The yellow fever pestilence has been proved to be conveyed from the sick to the healthy by mosquitoes. The steps taken by the Americans in Havana afford striking demonstration of the part played by these insects in the propagation of disease. After various sanitary methods had been tested and found futile, a campaign was undertaken against the mosquitoes, and the disease disappeared as if by enchantment.

Sleeping sickness, a fatal disease, is conveyed and inoculated by the tsetse-fly. The European Powers, alarmed at the rapid extension of the disease and the heavy mortality it is causing, have convened an International Conference of the leading scientific authorities on tropical diseases to concert methods for the destruction of the tsetse-fly.

Among other examples may be mentioned enteric fever and cholera, conveyed by the house-fly ; various forms of relapsing fever, by ticks and bugs ; trichinosis by the rat ; and redwater fever and other diseases in cattle by ticks. The striking discovery has recently been made that the house-fly is a principal factor in the dissemination of the epidemic of summer diarrhœa among infants. Probably many other diseases of men and domesticated animals of which little is known are similarly conveyed by vermin.

Work of the Society.

The Society for the Destruction of Vermin, which is in process of incorporation under Board of Trade regulations as a public association not formed for the object of making profit, will :

(*a*) Collect information from all sources on the distribution and life-history of vermin. It will pay especial attention to the part played by vermin in disease causation.

(*b*) Disseminate as widely as possible the acquired knowledge by means of the general Press, and also by special reports, leaflets, and lectures. It will endeavour to make known to the public the dangers connected with each kind of vermin, the necessity for exterminating certain species, and the best means of destruction.

(*c*) Carry out experiments in the field, test any promising measures suggested for the destruction of vermin, and, if funds permit, distribute gratuitously to such persons as are unable to afford the expense the necessary substances and apparatus.

Scientific Committee.

A Scientific Committee is in process of formation for the purpose of collecting and sifting information. The following gentlemen have already agreed to act on this Committee: Sir Patrick Manson, K.C.M.G., F.R.S., M.D.; F. M. Sandwith, M.D., F.R.C.P.; Frank E. Beddard, F.R.S.; R. T. Pocock, F.Z.S.; E. E. Austen, F.Z.S.; James Cantlie, M.A., M.B.; Sir T. Lauder Brunton, M.D.; Carl Prausnitz, M.D.; Louis W. Sambon, M.D., F.Z.S.; W. P. Pycraft, A.L.S., F.Z.S.; Frederick Hobday, F.R.C.V.S., F.R.S.E.

Subscriptions.

The Society for the Destruction of Vermin, which has already received the support of many eminent physicians, bacteriologists, and chemists, together with that of agricultural and poultry organizations, public associations and other bodies, will be glad to receive financial assistance from all who appreciate its object. Subscribers of not less than 10 guineas are entered on the Founders' Roll of the Society; subscribers of 1 guinea per annum become members, and associates may be enrolled at a subscription of 5s. per annum. The Secretary will supply particulars of affiliation fees to agricultural clubs and associations desirous of alliance with the Society. Offers of assistance in the scientific and active work of the Society will be heartily welcome.

Full particulars can be obtained from the Secretary, Mr. A. E. Moore, 1, Palace Gardens Mansions, Kensington, London, W.

Miscellaneous.

THE NEW DIRECTOR OF THE NEW YORK STATE VETERINARY COLLEGE.

At a recent meeting of the Board of Trustees of Cornell University, Veranus A. Moore, M.D., was elected Director of the New York State Veterinary College, to succeed Professor James Law, F.R.C.V.S.

Dr. V. A. Moore graduated from Cornell University, and later entered the pathologic laboratory of the United States Bureau of Animal Industry with Dr. Theobald Smith, whom he succeeded as Chief Pathologist, and continued in that position until called to the chair of Pathology and Bacteriology in the New York State Veterinary College in 1896, which position he has continued to fill with distinction.

In addition to numerous contributions to current literature, and his recorded investigations in the reports of the Bureau of Animal

Industry, he is the author of "Pathology and Diagnosis of Infectious Diseases of Animals," which is widely known.

His advancement to the Directorship is a well-marked evidence of the esteem in which he is held, and promises well for the advancement of the veterinary profession in America.

ROYAL COLLEGE OF VETERINARY SURGEONS.

Fellowship Degree.

A meeting of the Board of Examiners for this Degree was held on the 16th ult. at 10, Red Lion Square. Six candidates entered for the examination, and the following gentlemen passed and obtained the Diploma: Mr. G. S. Bruce, Capt. W. A. McDougall, Capt. E. P. Barry, Mr. C. H. Sheather.

The Examiners were: Messrs. J. Malcolm, W. Hunting, and Prof. Macqueen, Mr. W. J. Mulvey being in the Chair.

Fred Bullock, *Secretary.*

UNIVERSITY OF LONDON.

Professor G. H. Wooldridge, F.R.C.V.S., of the Royal Veterinary College, London, N.W., has been recognized as a teacher of the University in the subject of Veterinary Hygiene.

Translations.

TYPHO-MALARIAL FEVER.

BY M. A. TEPPAY.

The following observations were made during an outbreak amongst the horses of the garrison of Port Louis, West Africa, in 1906.

On October 23, 1906, an Arab, aged 6, belonging to the first squadron of Senegal Spahis was reported to be off his feed since the previous evening. The animal was in a state of stupor, and there was a loss of power over the loins; the conjunctiva was of a dark violet colour, and studded over with darker coloured petechial patches. The mouth was hot and the lips œdematous; the temperature 46·6 C. Auscultation and percussion showed nothing wrong with the lungs, although the respirations were quickened, *i.e.*, blowing. The patient was bled, 3½ litres being extracted, and given 4 grammes each of caffeine and quinine in dilute hydrochloric acid. During the day mustard was applied to the chest, and two injections of 1 gramme each of caffeine given. In the evening the temperature rose to 41·2° C. The animal died during the night.

The same day another horse in the same squadron, "an Arab, aged 8," was admitted to the infirmary with the same symptoms. The same treatment was given, but he died on October 25 in the afternoon. On October 26 four more died in the same fashion. The infected stables were emptied, and the inmates removed outside the town.

On October 28 four other horses died, and on the 29th and 31st two more. Altogether during the outbreak the deaths were eighty-four Arabs of from 6 to 11 years of age in the cavalry, five in the artillery, and three belonging to the infantry; there were also two mules. Amongst private animals were three imported French horses, one Arab, and two mules.

The outbreak took place almost entirely among the Arab horses in the garrison of Port Louis, and these were entirely Soudanese or Senegalese, "locally known as the Baiards," belonging to private firms and the municipality, but it unfortunately was impossible to get statistics of the outbreak, as the bodies of those that died were thrown out into the jungle, and no return of any sort was kept.

All breeds of horses, both native and imported, were infected, but Arabs and imported French horses nearly all died. A certain number of country-breds, however, recovered, Mules appeared to be more resistant than horses, and donkeys were altogether immune.

Symptoms.—(*a*) Horses. The disease, "which was first noticed in 1905-6," was both acute and sub-acute, and the symptoms were almost identical in every case. The first to be noticed is that the patient is in a state of insensibility and stupefied, "which probably caused the earlier observers to apply the term (typho) to the disease, as there is but little other resemblance between it and human enteric." Even the most nervous and restive become dull, and take no notice of surrounding objects, the head is hung down and carried low, tears tinged with blood flow from the eyes, and the upper eyelid is swollen and hangs over the eye. The respirations are about 70 per minute, and the pulse small, thready, and quick. The loins are rigid, and conjunctiva a dark violet colour, studded over with bright red petechial patches, that stand out prominently on the membrane. The buccal mucous membrane is congested especially around the edges of the gums, where a dark violet-coloured line is formed; the mouth hot and dry, and the breath has an ammoniacal smell. From the commencement of the attack the lips are swollen and the lower one hanging. The temperature varies between 39·8° and 41° C. from the commencement of the attack, and remains there during the time the attack runs its course.

In some cases there is a slight discharge at the beginning, which disappears, to reappear again just before death. This discharge is thick, of a yellow colour, and in consistency resembles gelatinized serum.

These symptoms continue for from eighteen to twenty-four hours, when the patient lies down, showing slight symptoms of colic, and the respirations go up to 120 per minute. The pulse becomes imperceptible, and the animal dies after making efforts to get up on its legs.

In certain rare cases the period of evolution of the disease is three days, and the author has only seen two in which this time was surpassed. In one the animal died in eight days with the lesions of general anasarca that complicated the primary disease; he saw a similar one in 1905. In the sub-acute form the course the disease runs is much quicker, and death may take place in from four to six hours.

The death-rate is very high, and out of the military animals only three recovered, of which one was an animal belonging to the public

authorities, and another a country-bred, the private property of an officer. In both these cases the symptoms were most severe for three or four days, when they improved, and recovery took place after a very short period of convalescence.

(*b*) Mules. The symptoms are not so acute in the mule as in the horse. The first weakness is not so well marked, and the appetite is preserved, although the temperature may vary between 39·5° and 40·5° C. The conjunctiva is deeply congested with petechia that stand out in relief, the respirations run up to 60, and the pulse is quick.

This condition lasts for from four to eight or ten days, a case in which it lasted as long was seen in a mule.

Post-mortem Appearances.

The lesions, like the symptoms, are almost identical in all cases. They consist of congestion that is not specially localized.

Circulation.—The blood is very thick and tary, coagulates slowly, and takes a long time to colour red when exposed to the air. The serum is deeply stained red, but neither piroplasms nor trypanosomes are to be found on microscopic examination. The heart contains only a very small quantity of blood, and the pericardium is distended with a quantity of clear yellow-coloured fluid. In only one case out of a number examined by the author was this condition of things wanting.

Digestive System.—The whole of the organs are greatly congested. The mucous membrane of the mouth and the tongue are of a dark purple colour, that can be compared with the line seen on the gum. The stomach is generally empty, or only contains a very small quantity of food, and the mucous membrane is deeply congested.

The peritoneum is covered with vascular ramifications and petechia, and these latter are very plentiful on the peritoneal fold that sustains the floating colon and rectum. They appear as violet-coloured patches. Both small and large intestines are empty and slightly distended with gas, but there are no ulcers on Peyer's patches. The liver is congested, friable, of an olive yellow colour, studded over with red puncta. On section the blood is found to be black, tary, and does not coagulate. Glisson's capsule is easily removed, and there are a number of hæmorrhagic patches under it in various places.

The spleen also is congested, but not hypertrophied. The surface is of a deep blue colour, studded over with a number of stellate patches of a bright red colour, that are in marked contrast to the background of the organ. This peculiarity, which the author has already noticed in 1905, is always present both in horses and mules, and this lesion, with the fluid in the pericardium, is typical of the disease. These two lesions and the peculiar colour of the spleen have not been noticed by the authors in any other disease that they met with in Senegal. The kidneys are hyperæmic, and on section a quantity of black blood and viscid urine with a pronounced ammoniacal smell escapes. The bladder is usually empty and contracted, the muscles flaccid and discoloured.

Respiratory Apparatus.—The bronchi are filled with a large quantity of blood-stained frothy mucus, and the lungs are gorged with blood; hæmorrhagic infarctions are also seen. On section of the lungs the

blood that escapes is black, and does not redden by exposure to the air readily. The pleura are congested, studded over with petechia, and greatly thickened.

Diagnosis.—The early appearance of the first symptoms, viz., the rise in the temperature, coloration of the mucous membranes of the eyes and mouth, and the way the disease spreads, allows it to be recognized early. The lesions of general congestion, and especially the peculiar and characteristic ones of the spleen and thickened pericardium, are diagnostic.

Typho-malaria may be mistaken for horse sickness, as it appears suddenly, and like it is acute, and appears in an epizootic form, but it is not transmissible from one animal to another by direct inoculation with the blood. Experiments in this direction have been made by Dr. Thiroux, at the St. Louis bacteriological laboratory.

Typho-malaria is distinguishable from anthrax, which makes its appearance in the same sudden fashion, by the absence of any bacteria in the blood, and the negative results that are obtained by inoculation. It more resembles influenza or pasteurelosis of the hæmorrhagic septicæmia group of Nocard and Leclainche, as both diseases develop in the same sudden manner, and in both the patient is in a state of stupor. Inoculation gives but negative results, and cultures with the blood are sterile. In both cases also there is general congestion. Typho-malaria is more fatal than typhoid, but it must be remembered that it is usually seen in imported animals living in a very different climate to their native one in which they get slack after the winter, and that it is young unacclimatized ones that are usually the victims. In typho-malaria there are no petechia on either the internal organs or the external mucous membranes.

The common characters of the two diseases have been known for a long time past, and have been noted upon by previous writers. The term malaria that the earlier writers thought indicated the disease is incorrect, as at no time are any of Laveran's hæmatozoa found in the blood, and quinine is quite useless, even in large quantities. To sum up, the nature of the disease is quite unknown, and although Surgeon-Major Thiroux has been enquiring into the matter at the St. Louis bacteriological laboratory, the results are quite negative.

Treatment.—Various methods have been tried, but they have all proved to be useless. Quinine will not reduce the temperature, and caffeine is without result. The only thing of any use is to inject a dose of 1 in 1,000 solution of corrosive sublimate subcutaneously, 0·50 gramme daily. Only one subject, however, was treated by this method.

The following are the different methods of treatment that have been adopted:—

(1) Commence by bleeding, 3 or 4 litres, mustard blisters, and 4 grammes quinine and 5 grammes caffeine. Antistreptococcic serum 30 cc. This latter was suggested by some cases of anasarca, following on typho-malaria, that were seen by the author in 1905.

(2) Quinine 4 grammes and caffeine 1 gramme, in four injections every twenty-four hours.

(3) Sulphate of soda 1,500 grammes every second day, 1,000 the first day and 500 the second; alcohol 95 per cent., two wineglassfuls in twenty-four hours in tea.

(4) Pilocarpin two doses subcutaneously of 10 centigrammes, with caffeine and mustard blisters.

(5) Subcutaneous injections of bichloride of mercury, two doses daily, subcutaneously, of 25 cc. of 1 in 1,000 strength. Only one case so treated.

On November 21 a Soudanese horse, aged 7, was admitted to the sick lines suffering from typho-malaria. The animal was very restless, the temperature 40·2° C. A mustard blister was used, but without result. During the day 50 cc. of a 1 in 1,000 solution of corrosive sublimate was injected subcutaneously, giving rise to profuse salivation after each injection. On the 22nd the temperature had fallen slightly (39·9° C.), but the animal was worse than the day before. The respirations were 70 per minute, and the pulse imperceptible. The same treatment was adopted. In the evening the temperature was 38° C., and the animal somewhat better.

On the 22nd the temperature was 39·2° C., and the case much improved, the animal feeding.

On the 24th temperature 39·2° to 39·1° C., the general condition much improved, and the patient ate a pailful of monkey nuts.

On the 25th the general condition was better; temperature 39° C. The injections of corrosive sublimate were discontinued. The next day the patient had improved, and was given half an hour's walking exercise daily.

On the 30th the temperature rose to 39·9° C., a large number of abscesses had been formed, and pointed where the subcutaneous injections had been made. These were opened, and the cavities syringed out with cresyl solution, and for some days iodide of potassium in 5-gramme doses was given daily. The patient rapidly recovered, and is now being ridden as an officer's charger.

(*Revue Générale de Médecine Vétérinaire.*)

PERICARDITIS IN THE PIG FROM ECHINOCOCCUS.

BY E. VAMOS (BUDAPEST).

THE author has met two cases of echinococcus giving rise to pericarditis in the pig within the last six months. In both cases the peri- and epicardium were covered with a false membrane from 2 to 5 mm. in thickness that formed loops and fringes. In the connective tissue were a number of cysts varying in size from a pin-head to that of a nut, some of which were broken by the movement of the heart. In one case there were several found in the liver.

(*Husszemla.*)

TREATMENT OF CATARRHAL STRANGLES BY MEANS OF ANTISEPTIC NASO-PHARYNGEAL INJECTION.

BY PAYROW.

IN cases of catarrhal strangles, in addition to ordinary treatment, *i.e.*, mercury blisters under the throat, diuretics and laxatives, the author recommends the following antiseptic naso-pharyngeal injection: Guaiacol, 15 grammes; crystallized carbolic acid, 15 grammes; menthol, 40 grammes; olive oil, 1 litre. Each patient was given 5 grammes in

each nostril two or even three times daily, according to the severity of the case. As the inflammatory symptoms disappeared the number of injections were decreased. A human catheter, 40 to 42 cm long, is employed, and two assistants held the head slightly downwards. The operator then passed the sound up the nostril, along the floor of the cavity. It was previously attached to a syringe containing the fluid, which was injected by gently pressing on the piston with the thumb. The liquid escapes by an opening in the side of the nozzle of the syringe in a fine spray, and penetrates over the whole of the naso-pharyngeal cavity.

Most animals can be operated upon without any trouble. The difficult ones are about 5 to 6 per cent., and the impossible 3 per cent. Out of a stud of 342 in which the disease broke out in 1903, there were 279 cases, with a mortality of 1·7 per cent., which was 50 per cent. below the average of preceding years. The average number of days each animal was under treatment was sixteen. In 1904, out of another stud of 344 horses there were 165 cases of strangles which were treated by naso-pharyngeal injection, with only one death. The average duration of treatment was twelve days, and the number of subglossial and retro-pharyngeal abscesses was 50 per cent. below those of preceding years.

(*Bulletin de la Société Centrale de Médecine Vétérinaire.*)

TREATMENT OF ULCERATIVE LYMPHANGITIS IN THE HORSE, WITH ANTI-DIPHTHERITIC SERUM.

BY M. VALLÉE.

Being struck with the morphologic resemblance between the bacillus of human diphtheria and that of ulcerative lymphangitis, as described by Nocard, the author determined to try the effects of the Pasteur institute anti-diphtheritic serum. Up to the present he has only had an opportunity of trying it on one case that had been under treatment for some weeks. The serum was used in doses of 40 to 50 c.c. hypodermically every fourth day, also locally in the form of a powder.

The results were most successful, as in forty-eight hours the ulcers began to dry up and cicatrize, and no new ones formed.

The author hopes that other practitioners who have cases under their care may be induced to try this method, and give the results of their experience.

(*Recueil de Médecine Vétérinaire.*)

Correspondence.

ASSOCIATION OF VETERINARY OFFICERS OF HEALTH.

To the Editors of the Veterinary Journal.

Dear Sirs,—I am instructed by the Provisional Committee of the Association of Veterinary Officers of Health to bring under your notice the advantages offered by such an organization. Its objects are to stimulate general interest, advance veterinary science and watch legislation in relation to public health, and to advance the position of Veterinary Officers of Health.

Almost every profession now possesses some organization by means of which its interests are promoted, and it therefore behoves every veterinary surgeon employed in public health work to join this Association and thus render its influence as powerful as possible, not only in moulding legislation in accordance with the scientific requirements for its purpose, but also in securing for the members of the veterinary profession that recognition of their worthiness of the trust which ought to be reposed in them as being specially trained for the work of meat and milch cow inspection.

At present the question of the better supervision of our meat and milk supply has reached a most critical stage, inasmuch as general legislation on these subjects cannot be much longer delayed, and those who attended the first meeting were so deeply impressed with the advantages of united action in such circumstances that they unanimously agreed to become life members.

The Provisional Committee, consisting of Professor J. McLauchlan Young (Aberdeen), Messrs. J. S. Lloyd (Sheffield), J. A. Jordan (Belfast), William Robb (Airdrie), James McPhail (Leeds), Thomas A. Douglas (Kilmarnock), John Malcolm (Birmingham), and A. M. Trotter (Glasgow), thus representing all parts of the United Kingdom, earnestly hopes that, inspired by the old adage "Unity is Strength," you will lose no time in sending your application for membership to me at this address. The entrance fee is 10s. 6d. and the subscription 10s. 6d. per annum, or £5 for life.

A general meeting is to be called in June for the enrolment of those prepared to join, and to decide as to further action.

Yours faithfully,

A. M. TROTTER.

Moore Street Abattoir,
Glasgow,
May 26, 1908.

Books and Periodicals, &c., Received.

Journal of the Royal Army Medical Corps; Tropical Agriculturist (Ceylon); Agricultural Journal of Cape Colony; London University Gazette; American Veterinary Review; Veterinary Posology (G. A. Banham).

Letters and Communications, &c.

Mr. G. Mayall; Oetzmann and Co.; Mr. A. M. Trotter; Captain Knott; M. Elphick, Department of Agriculture and Technical Instruction for Ireland; Board of Agriculture and Fisheries.

NOTE.—All communications should be addressed to 8, Henrietta Street, Covent Garden, London, W.C. Telephone, 4646 Gerrard. Telegrams, "Baillière, London."

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